

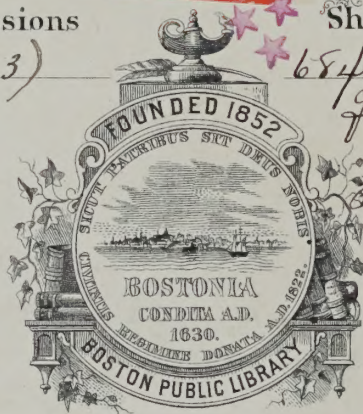


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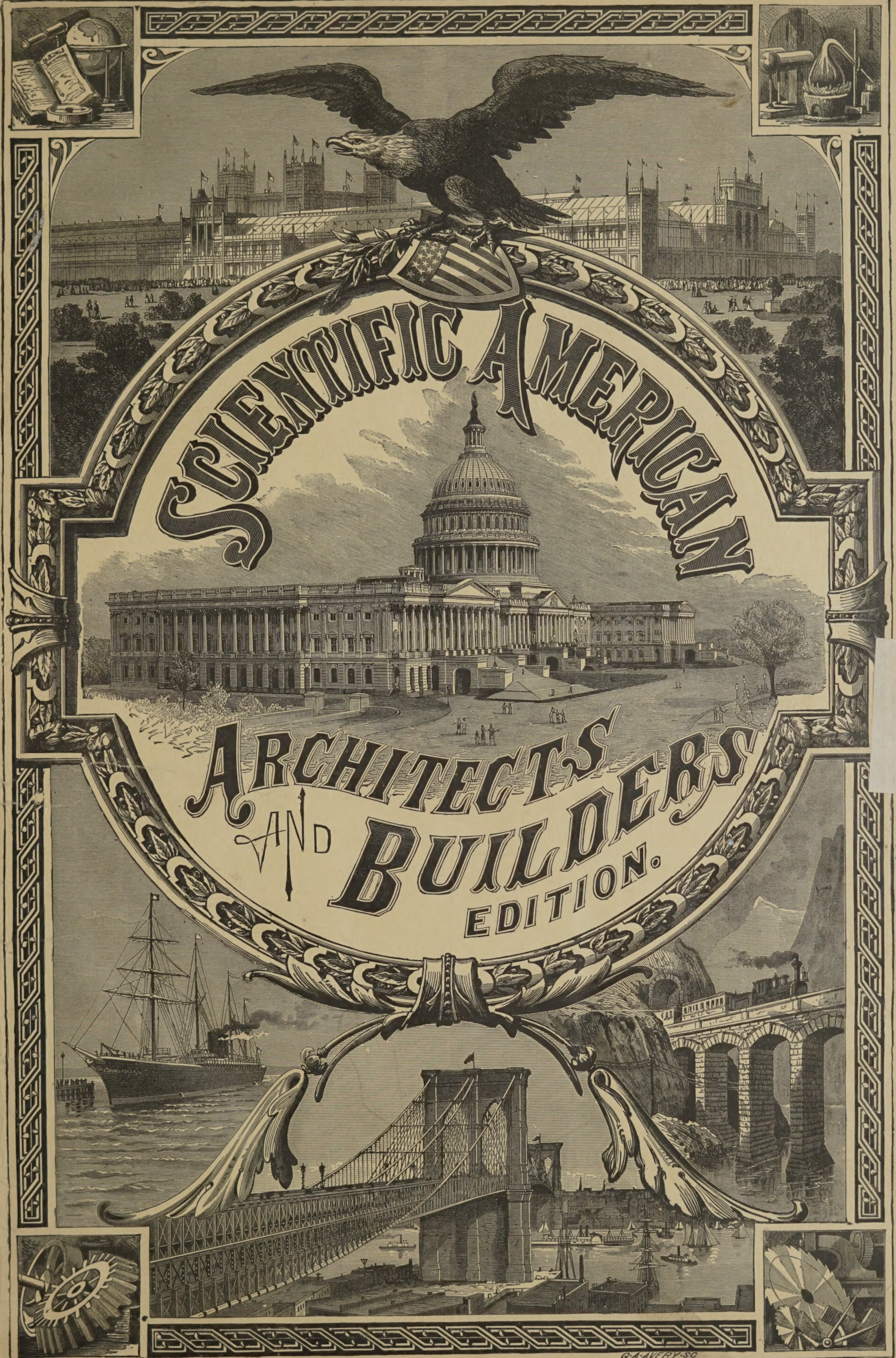
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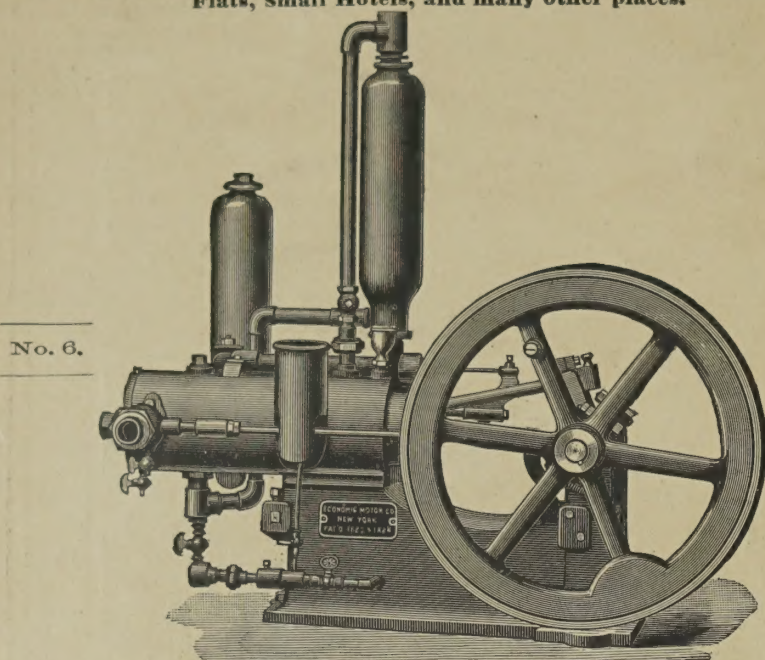


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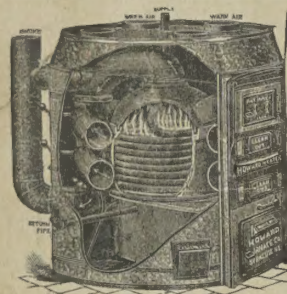
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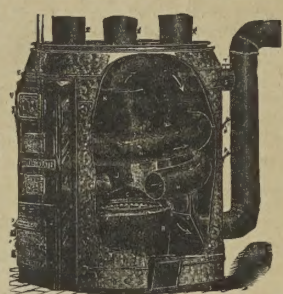
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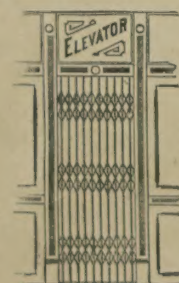
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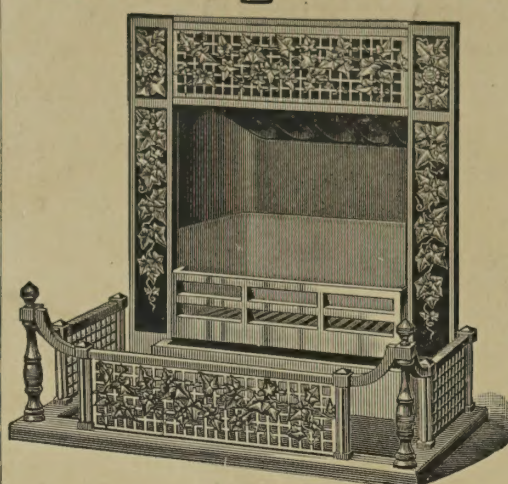
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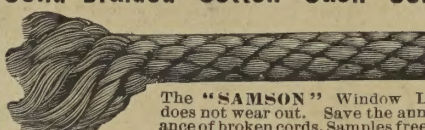
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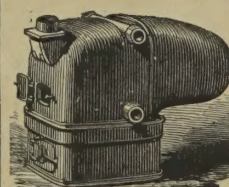
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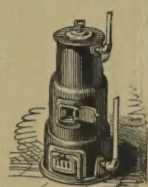
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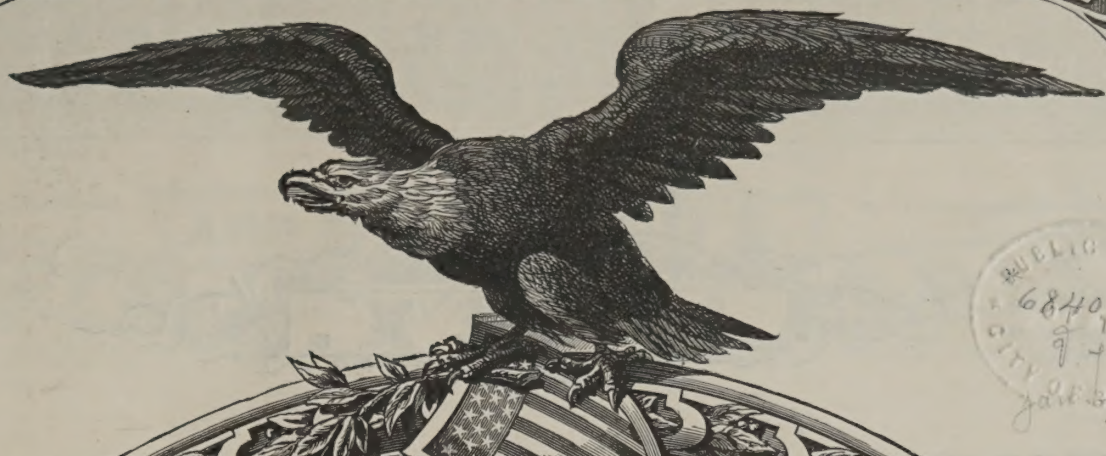
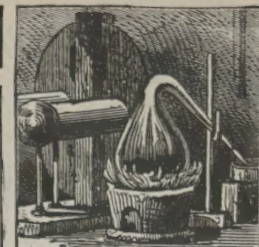
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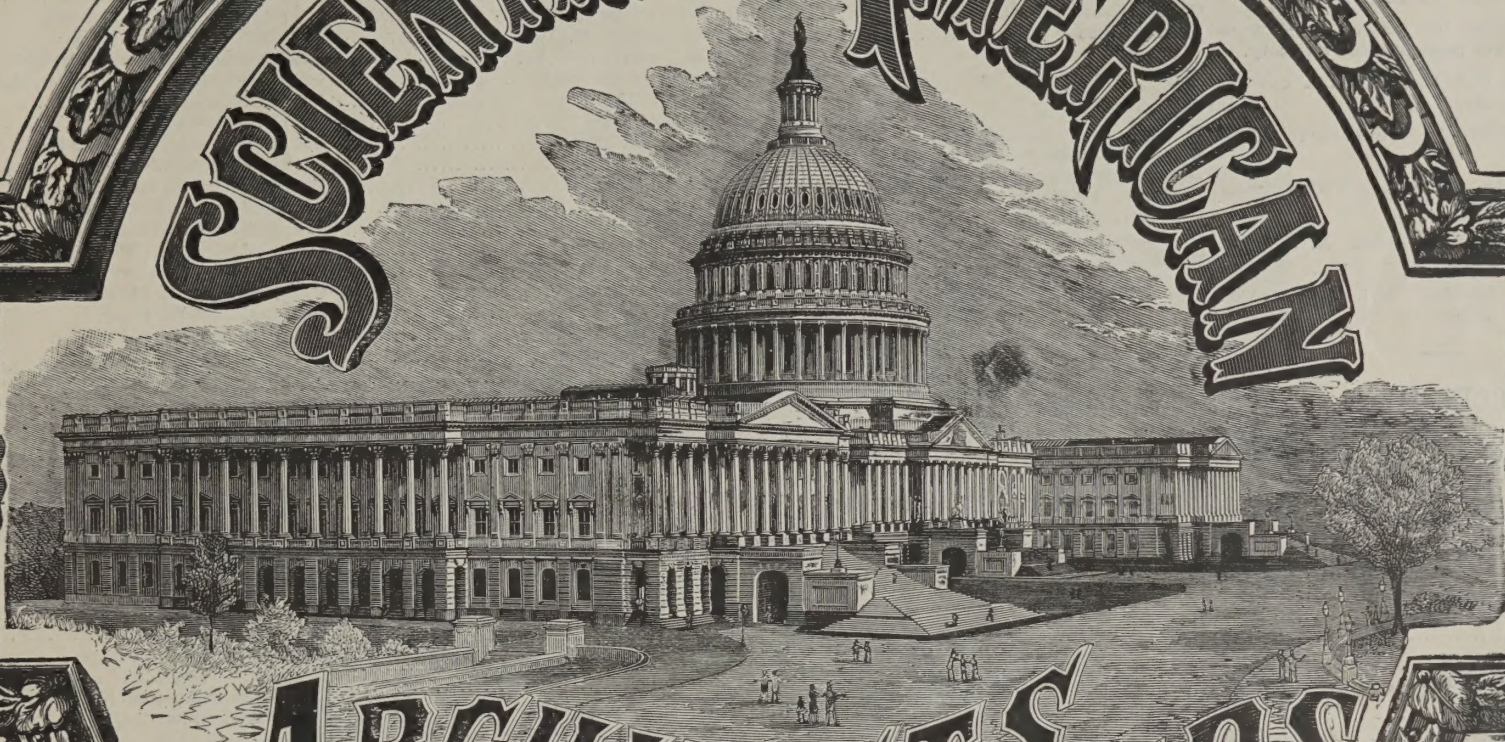
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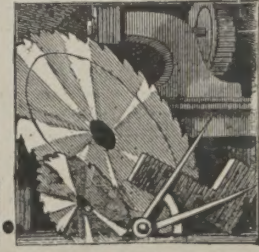
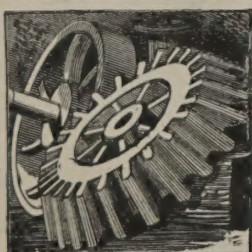


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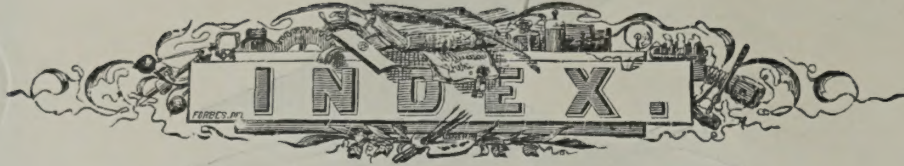
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JANUARY-JUNE,
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VOLUME VII.-JANUARY-JUNE, 1889.

Articles Marked * are Illustrated.

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- I. A Southern house for \$2,000. II. Fourteen brick dwellings of moderate cost. January.
- III. A suburban club house. IV. A country dwelling. February.
- V. A cottage for \$3,000. VI. A dwelling for \$5,000. March.
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- IX. A summer cottage for \$1,200. X. A dwelling for \$4,000. May.
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CONSTRUCTION AND FINISH OF HOUSE FLUES.

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The apparent point of difference is between the respective merits of the old fashioned "pargeted flue" and the more modern flue built of hard brick, with tightly filled joints struck smooth on the inside and whitewashed. The process usually employed in this vicinity in building both kinds of flues is as follows:

THE PARGETED FLUE

is usually built of hard burnt salmon or even hard brick, and the joints are made and filled only from the outside face of the brick, in order to leave a key for the pargeting to clinch itself on the inside. This pargeting is laid on from a quarter to a half inch thick all round on the inside, thus reducing the capacity of the flue by the cross section of all the pargeted work, and experience has proved that, there being no direct bond between the mortar used in laying the brick and that used in pargeting the flue, the same is liable, from the effect of gases and expansion, to part, and the pargeting to disintegrate and fall off; on the other hand, the struck joint flue is built solely of hard brick, with the smooth face of the brick inside, and all joints vertical and horizontal, entirely filled with mortar, and struck perfectly smooth and flat on the inside and properly mitered, thus forming an almost perfectly smooth inside face with no chance for disintegration, the heat of the flue hardening the same without fear of cracking, and the entire flue being whitewashed with a fresh lime wash of a sufficient body to fill all bee holes, crevices, and even the pores in the brick, thus preserving the entire cross section of the flue.

Ans.—The disadvantages of pargeting are clearly stated in our correspondent's letter, but its advantages are overlooked. The practice of pargeting began at an early date, almost from the beginning of chimney construction, and it was resorted to because the art of brick making at that time was crude, and bricks were not only warped out of shape, but often had ragged edges and corners, and it was the custom then, as now, in many places, to use inferior bricks in flue construction. Where the bricks are rough finished or want of care is shown in selection, pargeting would be superior to a struck-joint flue. The whole question of superiority lies then in the smooth faces of the flue, so that there will be no projecting points or edges upon which soot may find lodgment.

If straight-edged, smooth-faced brick are used, with joints struck true, it would be superior to a pargeted flue. Superior, however, to either method would be glazed earthenware flues, laid with lime joints; for, no matter how carefully a struck joint flue is laid, it is difficult, if not impossible, to make its faces uniform and free from depressions or slight projections, owing to the warpage of a brick's face.

A SOUTHERN HOUSE FOR \$2,200.

We publish this month a plate of colors showing the perspective, and on page 12 the plans, etc., for a one-story Southern house of low cost. The object aimed at by the designer is plenty of air with convenience and simplicity.

The plan can be divided into three compartments: First, the living and dining rooms, which we will call the family apartments; secondly, the sleeping apartments; and thirdly, the offices; this encompasses the kitchen, pantry, servants' apartment, and the various store rooms.

The living room is large, with an angle bay; this feature has been introduced, as it gives a good opportunity to get the amount of ventilation necessary in this class of dwelling, gives good light, and adds considerably to the beauty of the room, also giving externally a pleasing feature, and generally giving entire satisfaction for the extra cost over a square angle.

The hall is eight feet wide; this runs through the dwelling, giving a through current of air, and could be made any width without interfering with the design in any way, to suit the requirements of the person intending to build. The through hall we consider a vital necessity, as it acts as a ventilating shaft for the entire dwelling.

The dining room is placed next the living room and adjoining the kitchen. In the extreme hot weather, the door from the dining room into the side passage would be kept closed, and the things carried across the porch into the dining room; thus cutting off odors. In the fall, winter, and spring, the door into the passage would be used, which is at once convenient and a simple way of obtaining access from the dining room to the various offices without having to pass through the hall.

The offices are arranged for convenience to the dining room and providing all the necessary store, pantry, and wood shed; the servants' apartment being placed

at the extreme end of the building, approached by the covered porch.

The sleeping apartments are arranged for privacy, being disconnected with the main building by the corridor, which is the entire length of the side wing, the various chambers opening off right and left. This is, doubtless, what ought to be. These rooms should be kept together, as the fact of having a one-story dwelling tends in the direction of the sleeping apartments becoming too much exposed.

The external character is broad and pleasing, the study of the designer being more in the direction of general outline than flimsy detail.

The material to be used is as follows:

Foundations, cedar posts 8"×8", with 6"×4" plate; sheds 2"×4", faced double at door and window jambs and made perfectly solid. Clapboarding for exterior covering, with cement set on wire lath for gable ends; the curved ornament in same is a piece of tarred rope set in the cement.

Lime mortar, with a little admixture of Rosendale cement, is generally used on wire lath, and stands the weather very well; and if over this a coat of pebble dashing is laid, of thin lime and pebbles, it forms a good protection against the weather.

The roof would be covered with shingles, tiles, or slates; if shingles should be used, a stain as near the tint on the colored sketch could be used, and would make the contrast we have endeavored to produce.

The internal finishing would be the material cheapest and best for the various purposes according to the particular locality.

Special care should be given to the construction of the chimney shafts, as we do not know of any subject in the building trade so sadly neglected and so badly executed. The foundations for these shafts are, in most cases, bricks carelessly laid, without any other foundation on the ground, which, in many cases, is not even leveled true, and on the slightest settling of the ground the chimney shaft of a necessity goes with it, and thus causes the joints to open; and on reflection, it is not pleasant for a man who has probably built his dwelling after years of hard work and perseverance in accumulating the capital required, to think that between his property and destruction there is only four inches of twisted and badly constructed brickwork, out of which fire at any moment may make its way.

FOURTEEN BRICK DWELLINGS OF MODERATE COST.

One of our plates in colors this month shows a block of economic brick dwellings. For the floor plans see page 5, and for elevations, with details, page 13. The plans are designed for ordinary city lots, with 200 feet frontage by 100 feet deep, the block being divided into fourteen houses, making about 14 feet 3 in. for each house.

This frontage is, of course, very small, but in cities of high priced land, where ground cost, as a rule, is the foremost item to be considered, the narrow block house becomes a deplorable necessity.

To a certain extent, city houses must have some resemblance one to another, on account of the limited frontage, but the interior arrangement we propose to remodel.

It is usual in dwellings of these grades to fix the basement floor level slightly below the pavement, varying from 1' 6" to 3'. This is done to gain light below. But why should this be so? It makes the basement neither an honest cellar nor a suitable room for any other purpose. The arrangement necessitates a flight of exterior steps, of which some people have a mistaken idea, thinking it gives from the entrance an imposing appearance; but, even if this be so, what a falling off is there when the entrance door is opened, and the visitor is confronted by a long, dark passage, in which two persons cannot pass each other with any degree of comfort, and is totally unfit to hold the necessary requirements for an entrance, viz., a stand for umbrellas, a hat rack, etc. This passage is very objectionable, both in itself, and takes a strip four feet wide off the whole length of the parlor, making this room narrow and necessitating great depth to get the required accommodation. It is here where the outlay is greatest, as the building is made deeper. This means more brickwork, plastering, slating, etc. This expense we escape in the present new plan, as we get the parlor four feet wider by doing away with the passage.

Again, in our present plans, instead of making the basement floor below the ground level, we make it four inches above—just sufficiently high to keep out the rain water, the earth being excavated two feet below the floor and thoroughly ventilated.

On the floor we get a good front entrance, direct from the street, with plenty of space to comfortably hold all the necessary accompaniments required by and in connection with an entrance. The disagreeable outside steps are done away with, which are simply a source of dread to elderly people in frosty weather, and in place of them we get a comfortable internal staircase leading up to the parlor and dining room.

The kitchen we keep on the basement or entrance floor, with a flight of steps up into pantry, in connection

tion with the dining room, and with access to the other parts of the dwelling.

On reaching the first or parlor floor we find, on again referring to the plan, the parlor is now four feet wider, as above shown, having the full benefit of the entire frontage.

It would be necessary to write at considerable length to give anything like a detailed specification of the various different trades and departments required in the building, but that is not the object of this article, it being merely intended as an explanation for the deviation in the planning from the usual and hackneyed plan adopted by the builders in this and other large cities.

The deductions to be made from the above remarks are these:

Is it better to climb a flight of slippery outside steps or to comfortably gain your apartment by an indoor staircase?

Whether a four foot entrance, without room to turn round in, is preferable to an entrance ten feet square. Is a parlor long, narrow, and badly lighted equal to a room having a regular shape and well lighted? There are many more considerations of smaller importance, that, if space allowed, could be mentioned, but these are the leading features in the alterations. The ventilation is better and the cost is less.

The colored view is for a simple and uncostly front. This, of course, could be treated in many ways to suit location, etc.

We have full working drawings for this block of dwellings, which, of course, could be remodeled to suit any site and location. The cost of these houses is about \$2,200 each.

CONSTRUCTION OF MILLS.

The Boston Manufacturers' Mutual Fire Insurance Co., in a recent report on paper and pulp mills, makes

from the roof by rods held with trusses. There is much greater danger of the complete destruction of a mill under these conditions than there is when the floors are properly supported from below. There are many cases where the attic requires no floor, provided the roof were thick enough to prevent the condensation of moisture generated within the mill upon the under side of the roof. Such attics, when floored, are apt to be made use of for the storage of combustible material, by which the danger is much increased. We therefore advise the removal of such attic floors wherever it is possible. The floor boards may be carefully taken up, and fastened between the roof timbers upon the under side of the roof boards. Many roofs in textile factories have been made thicker in this way, with correspondingly good results. The passage of heat and cold through the roof will be very much less, the condensation of moisture may be wholly prevented, and the condition of the room below the attic in which the work is done may be greatly improved, while the risk of fire will be very much diminished. The better and safer way is to remove the pitched or French roof wholly, and to substitute a thick, flat roof. Some paper mills are now being improved in this way. This has been done in many textile factories with great benefit to owners as well as underwriters. Where the floor below the attic is also suspended from the roof, it should be supported from below. Hanging a floor from a roof truss is an unfit method of constructing a mill—costly, dangerous, and unsuitable. Much of the objection to posts is imaginary. There are no special objections to posts in a paper mill any more than in a textile factory. We therefore advise the substitution of posts or piers in all possible cases for the hanging rods by which floors are now suspended from a roof. These conditions will hereafter be considered in making the rates of premium upon paper mills.

We again condemn the pitched roof and the so-called

properly prepared and carefully applied. This mode of covering a flat roof is on trial.

A GIFT FOR CHRISTMAS AND NEW YEAR'S.

As a gift for Christmas or New Year's, what could be more appropriate, or more likely to be highly appreciated as a present to relative or friend, than a year's subscription to the SCIENTIFIC AMERICAN, ARCHITECTS AND BUILDERS EDITION?

The beautiful style of this publication, its elegant illustrations, the varied, interesting, and useful nature of its contents, combine to render it desirable and welcome to every one.

BEGINNING OF A NEW YEAR.

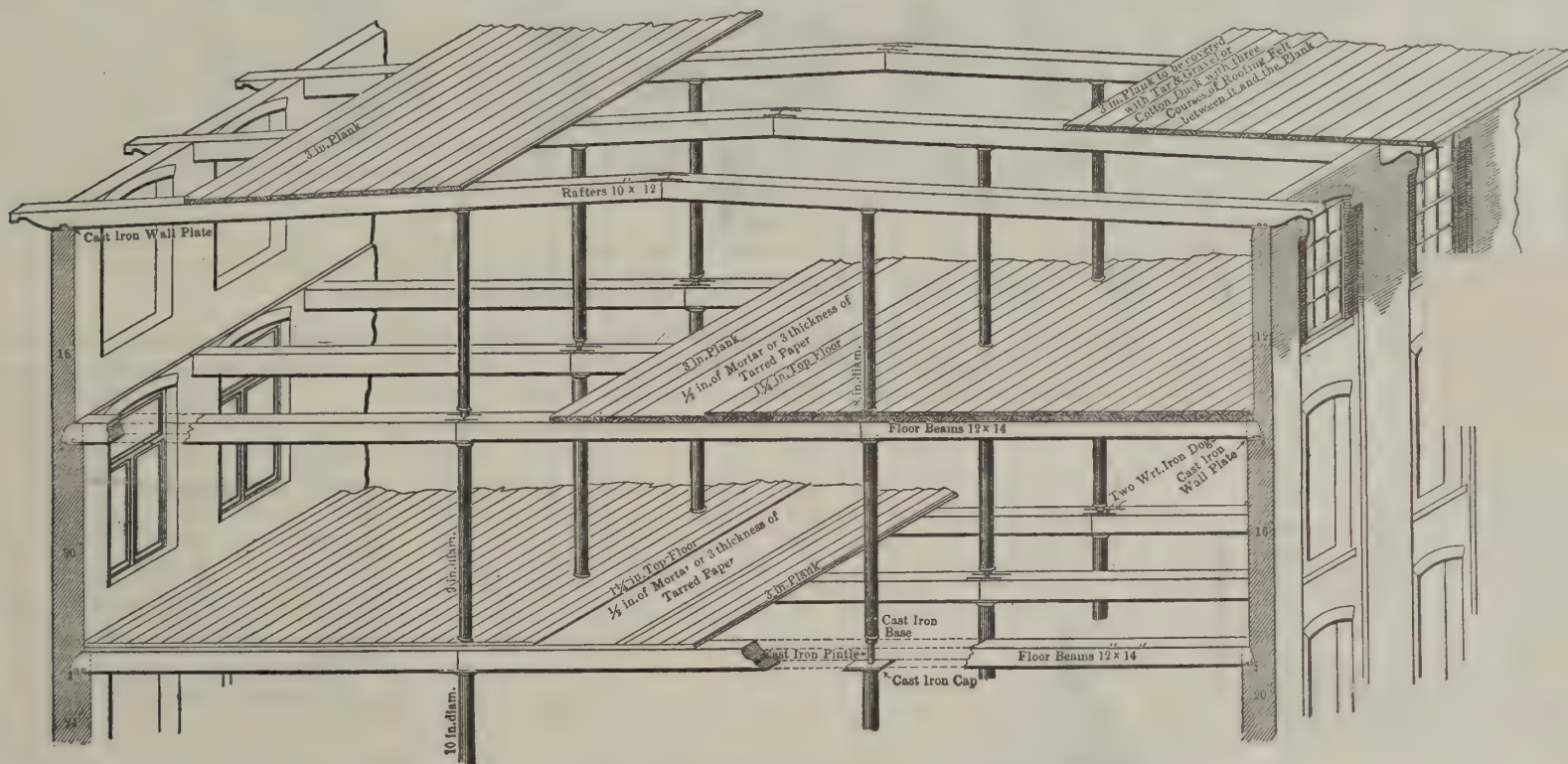
The present number opens a new volume and brings us to the first of a new year. Many subscriptions now fall due, and we ask our patrons to be prompt in sending their renewals, thus avoiding the loss of any numbers. The terms are only \$2.50 a year.

Considering the wealth of illustration, the variety and value of information presented, this work is by far the cheapest of anything in the same line.

To builders and those contemplating the erection of dwellings or other structures, our paper has proved to be of great value.

With every number during the past two years we have given plates in colors of many new buildings, with specifications, plans, and details. In most cases these have been so complete as to enable the builder and contractor to proceed at once with the construction; and on the plans thus presented, thousands of new buildings have been erected in all parts of the country. In almost every town in the land attractive dwellings are now to be seen, which, on inquiry, will be found to have been built from SCIENTIFIC AMERICAN plans.

No architectural publication in the world presents to



SECTION OF MILL SHOWING CONSTRUCTION OF TWO FLOORS AND ROOF.

several very excellent suggestions relating to the construction of mill buildings in general. We give from this report an illustration showing the section of a mill representing two floors and roof. We quote as follows:

It is suggested that when this construction is used for warehouses or other buildings where it is considered necessary to paint or varnish the floor beams, two sticks 6 in. x 14 in. each should be substituted for each floor beam, and two sticks 12 in. x 5 in. each for each rafter, laid with an air space between to afford ventilation and prevent dry rot. If solid sticks are used, they should be bored from end to end with 1 in. holes and small transverse holes for ventilation.

The columns should be bored from end to end with a 1 in. hole and bored transversely near the top and bottom with 1/2 in. holes for ventilation and to prevent dry rot. Pintles may be cylindrical or Greek cross shape in horizontal section.

The posts, if round, should not be tapered. Posts 8 in., 9 in., and 10 in. square are stronger than round posts of the same diameters.

The windows on the right are drawn of the customary size. It is suggested that much more light may be gained if the windows are made much wider, the wall between the windows narrower and four inches thicker, as drawn on the left. Windows may be hung in the ordinary way, as shown on the right, or may be made of large plates of rolled glass as shown on the left; the lower ones fixed, the upper one to open on hinges for ventilation.

A cause of danger which prevails to a much greater extent among paper mills than in the modern textile factories is the custom of suspending one or two floors

French roof, especially when slated. These forms of roof are out of date and out of place. They were always bad, and are now worse than ever before, in contrast with the modern flat roof made of solid plank three or four inches thick. The time is not far off when all such roofs will be removed, not only from paper mills, but from factories of all kinds, by owners who give such attention to their own interests as the subject calls for, without any regard to the contract of insurance or to the rate of premium on the policies.

We have suggested that hereafter no roof should be put over any part of a paper mill, except a flat deck made of plank not less than three inches thick, pine preferred, grooved and splined, sheathed underneath between the timbers if it is thought to be necessary for a finish, and covered on the outside with a suitable material; over the machine room one inch of mortar may be put upon the plank, and then a covering of suitable roof boards. Such a roof over a machine room, fitted with the system of ventilation as applied by Professor Woodbridge of the Institute of Technology, will entirely do away with the condensation of moisture over the Fourdrinier machine.

There remains, however, the problem of the outer covering of this roof with suitable material to shed rain, or, in common speech, "to keep out the weather." For this purpose the material in common use is either tin or one of the compounds of asphaltum or of coal tar and gravel. Tin is to be avoided wherever there is the slightest possibility for humidity to pass from within to the under side of the metal. Hollow roofs with air spaces in them are a snare and a delusion.

We have ventured to suggest the use of cotton duck

its patrons so many practical drawings without cost, except the merely nominal subscription rate of \$2.50 a year. It is hardly necessary to remind the builder that he would be obliged to pay several hundred dollars if the same number of plans were to be specially prepared for him.

In addition to the colored plates, and details, we have furnished a large number of other new architectural illustrations and many pages of valuable information. In all, the past year's volumes include about one thousand engravings.

We remind our readers of these items with the hope they will mention them to their friends, and if possible to secure a new subscription, to send it in with the renewal of their own.

Our aim is to improve and enlarge the sphere of work, rendering it more and more valuable. To this end we need the support and encouragement of as many subscribers as possible. If each one of our friends will do a little for us in this direction, all the parties concerned will derive benefit.

If any of our readers have inquiries to be answered, or suggestions to make, relating to subjects or features they would like to see treated in our paper, we shall, at all times, be pleased to hear from them.

Architects and builders who desire to see their plans reproduced in our pages are also invited to communicate with the editor.

A NEW sidewalk stone for Frederick Vanderbilt is 15 feet wide and 20 feet long. It was quarried at Oxford, Chenango County, and transported to this city on a special car.

NEW POST OFFICE AND REVENUE OFFICE, SACRAMENTO, CAL.
The new United States Court House and Post Of-

ice at Sacramento, Cal., W. A. Freret, supervising architect, is situated at corner K and Seventh, with main front on K Street. It is about 112' x 52', as shown

in illustration. It will have a central pavilion three stories high, with tower 90 feet high and 20 feet square, and side wings two stories high. In design it may be material consists of pressed and moulded brick, with stone trimmings. The main cornice and frieze will be terra cotta. Roof will be covered with terra cotta

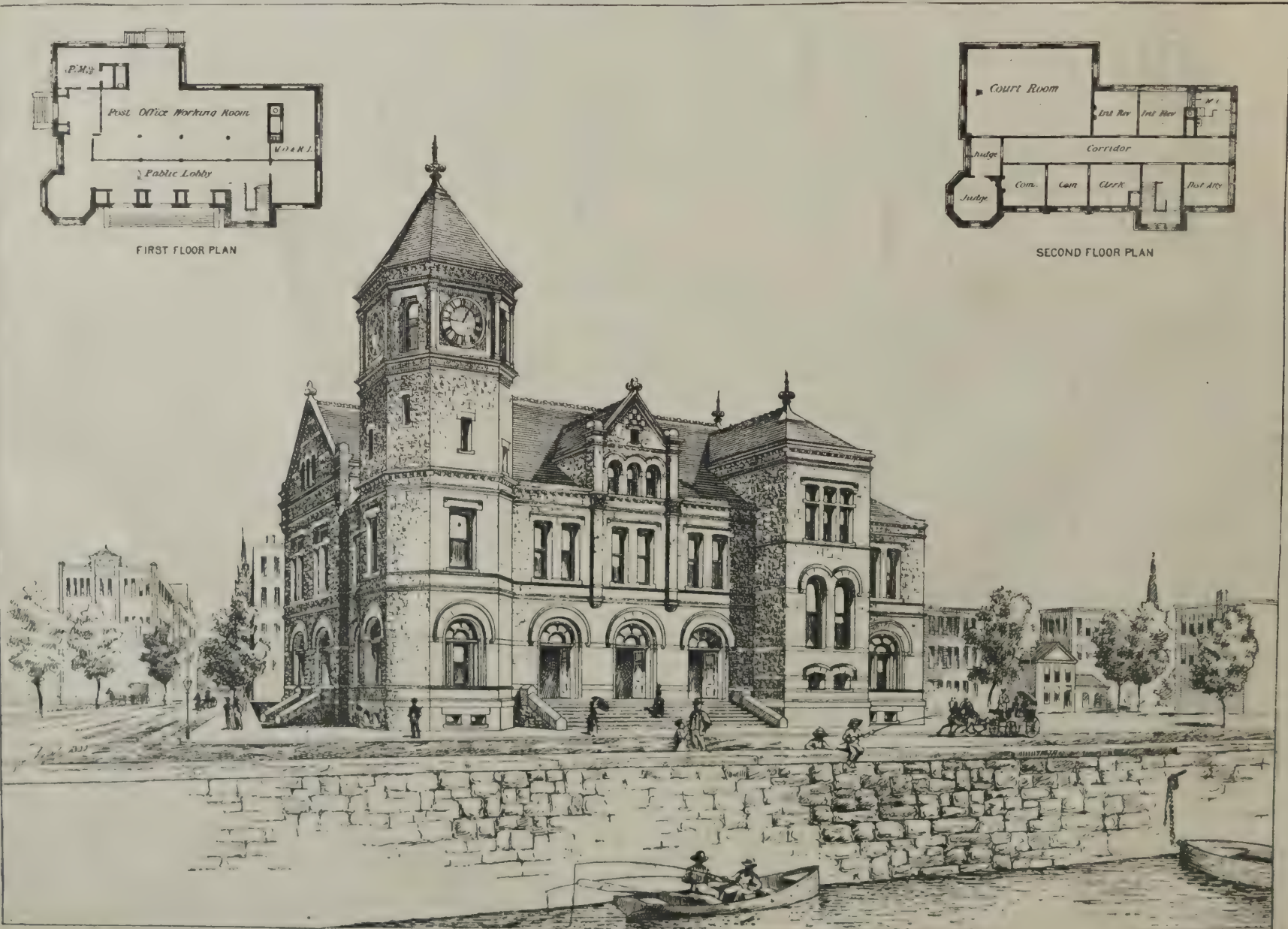


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THE NEW GOVERNMENT BUILDING AT BINGHAMTON, N. Y.



first and second floors will be marble tiled. The interior finish will be pine or cypress, with hardwood screen and stairs. The building will be heated with hot water, both direct and indirect radiation being employed. Especial attention is given to ventilation and sanitary arrangements for both public and employes. The following offices will be accommodated in the building:

Basement, heating apparatus, storage, coal, water closets, etc. First floor, entirely devoted to post office accommodations, contains postmaster's room, 16'x16',

THE NEW GOVERNMENT BUILDING AT BINGHAMTON, NEW YORK.

The new government building at Binghamton, N. Y., is already under contract, and will probably be ready for occupancy during 1889.

As shown by illustration, it is a substantial building of a pleasing design, in what may be termed a modified Romanesque style. The material of which it will be constructed is rock-faced sandstone, with Amherst stone trimmings. The roof will be slated. Dormers and cornices of copper.

the post office, a postmaster's office, 16'x17', post office working room, money order and registered letter department.

On the second floor a court room, 35'x50', with offices for the various court officials, internal revenue, etc. The third floor or attic will be utilized for jury rooms, storage, etc. In the basement the space is occupied by heating apparatus, coal space, storage and water closet. A prominent feature will be the octagonal tower on the corner of the building, about 90 feet high, with clock faces on four sides.



Fig. 1.



Fig. 2.

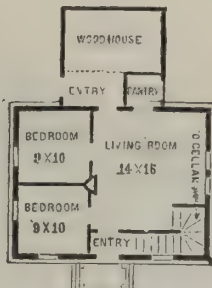


Fig. 3.

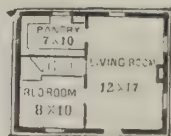


Fig. 4.

with a fire-proof vault, rooms for the railway mail service clerks, money order and registered letter departments, with vaults for storage of stamps, etc., and the post office working room, which contains 3,500 square feet.

The second floor contains ample accommodations for collector of internal revenue, and office, toilet and storage rooms, etc. The third story is utilized by furnishing a large dormitory for railway mail clerks. Files rooms and two large rooms for signal service, which also has rooms in tower and roof space assigned them for display of weather signals. Amount of appropriation, \$150,000. Cost of site about \$30,000.

Finish on interior will be pine painted, with hardwood post office screen and stairs.

The first floor will be fireproof, other floors and roof to be of wooden construction. All arrangements are for ample and commodious accommodation for the various offices, together with especial attention being given to the heating and sanitary apparatus. Ample fireproof vaults for the preservation of documents, etc.

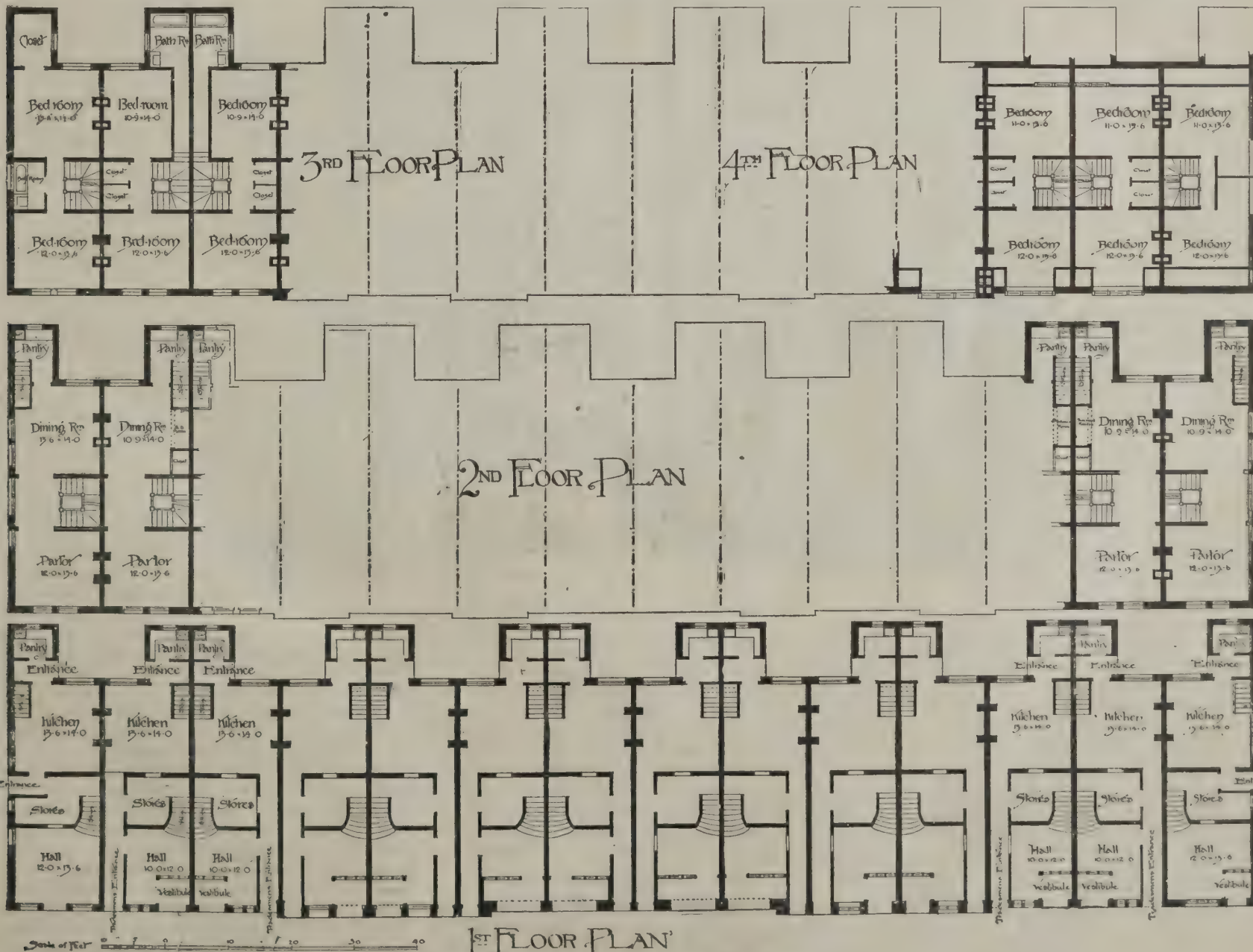
Artificial stone sidewalks, a stone curb, with iron fence on street fronts.

On the first floor the entire space, with exception of public corridor, will be devoted to the requirements of

Amount of appropriation, \$150,000. Cost of site, about \$15,000. Cost of building per cubic foot, about 22½ cts.

ECONOMICAL HOUSES.

We give, from the *Country Gentleman*, some small cuts and plans. The respective sizes will be understood by reference to the plans. Fig. 1 shows a house that will cost \$1,000 to build. It will measure 25x34 feet. Fig. 2 can be built for \$400, or a little more if the boarding is nicely planed and painted. Fig. 3 will cost \$800 or \$900. Fig. 4 will cost \$300. The only timbers are the sills and plates. Size, 18x23 feet.



FOURTEEN BRICK DWELLINGS.
[For description see page 2. For perspective views see colored plates. For details see page 13.]

THE TACOMA.

Tacoma building, twelve story, basement and attic, 80×101 ft.; height from sidewalk to top of cornice, 163 ft.; brick and terra cotta; first story, ornamental iron, glass and tile; construction, fireproof. A special feature of the construction being two fronts on Madison and La Salle Streets, which are inclosed with a thin facing of brick with a backing supported by the iron construction at each floor, there being no weight carried by the walls. They are reduced in thickness to the minimum, thus giving much additional floor space for offices. Another feature worthy of note is the continuous bays which extend from the second floor to top of building. The building will be finished in the most complete and elegant manner possible, including elevators, marble floors, wainscoting in halls, electric lights, and hot and cold water in each office. For our drawing and the above particulars we are indebted to the *Building Budget*.

Iron Roofs.

The length or span of a bay of roofing is generally determined by a conveniently safe length of purlin between two trusses. When this length is exceeded, the trusses must be made extra strong or be more elaborated in its members, and the purlins must be trussed, adding greatly to the expense. In iron roofs, these considerations are of much moment. If we take any of the roofs of our large railway stations, we find a certain length or bay taken and seldom exceeded. At each truss, or principal of the roof, there is a pillar, so the number of pillars is generally equal to the number of trusses or divisions of the roof longitudinally. The requirements of a railway station demand wide, unobstructed space on the platforms, so that the wider the distances of the pillars apart, the more convenient is the building for its uses. The terminus of the Great Northern Railway has a distance from center to center of piers of 20 ft., and this is considered a fairly good width of bay, and has been regulated by the distances at which the main circular ribs of roof have been placed. When it is necessary to increase the distances between the pillars longitudinally, either more elaborate trusses must be constructed or a deep, longitudinal girder of iron would be necessary to carry the intermediate roof trusses. Perhaps one of the most ingenious attempts to widen the bays between the pillars without weakening the roof is shown in the construction of the York station—one of the most recent and perhaps finest roof of the class in England. The circular iron columns which divide the three spans forming the station and carry the main roof principals or ribs are spaced about 30 ft. apart, and are joined together longitudinally by wrought iron ribs of elliptical shape, filled in with open iron ornament in the spandrels. These arches carry not only the feet of small rafters and gutter, but two arched or rib trusses on each side, making three bays of roofing instead of only one. The two curved ribs on the opposite sides, which are thus supported, come down and are carried on a sort of stirrup formed below the soffit of the longitudinal elliptical rib by curved braces, the whole resembling a pendant of ornamental design finished by a ball below. The effect of the longitudinal arcade dividing the spans is rendered rather piquant and ornamental by the addition of these drops or pendants, two to each arch. Great height has been saved by this expedient of carrying the inner ends of the cross ribs below the arch of the arcade; if they had rested above the arch in the usual way, additional height would be entailed, or the carry-

ing ribs joining the pillars would have had to be placed lower. This point is worth noticing in connection with iron roofs. We are not aware of any similar attempt to carry two additional cross ribs or principals in each bay, and we would say it is only as an iron treatment that the method becomes tolerable, as the suspending braces carrying the stirrup are in tension. The plan we have noticed allows of additional roof trusses to be put in, so as to allow of much wider bay or distance between the columns. In brick or stone buildings the mode of carrying the principal trusses directly over the piers is recognized, and an intermediate rib or principal rafter of lesser importance is often

block, five on the ordinary Belgian pavement, seven on good cobblestones, thirteen on bad cobblestones, twenty on an ordinary earth road, and forty on a sandy road.—*Sanitary News*.

Restricting Height.

Elevators in modern buildings have made upper stories so much more desirable than when stairways were the sole means of reaching them, that people have, to some extent, lost sight of the true value of light and air in cities. Frequently, the building laws of large cities abroad limit the height of buildings by the rights of the neighbors across the street to light, and a person may not build to intercept a line drawn at a lawful angle from the center of the first story windows of the building over the way. This, of course, permits him to add somewhat to the limit of height on the street by setting back in the upper stories and by roofs sloping with reference to this angle. The requirement also leads the most thoughtful designers into grouping the front walls into piers which are narrow as seen from the front, but very deep—a good arrangement for admitting light into the building, at the same time securing very stiff front walls, which admit of considerable setting back in the upper stories and offer much more resistance to the thrusts of the sloping roof. That some such regulation will some day find its way into our laws is not too much to hope. Chicago is demonstrating more rapidly than any other place of which we know the evils of allowing the individual to disregard the general good in building matters. In some of her down town districts, by reason of the high buildings of dark colored materials, her smoky atmosphere, and unsuitable arrangements of wall space and windows, the lower stories are practically given over to artificial lighting the year round. The notion with most designers of large business buildings in these days seems to be to impress the beholder with the idea of size, and we see therefore buildings of ten stories and upward in which, instead of advantage being taken of the chances to thin the wall from the outside as the higher stories are reached, many of them are made actually to appear to overhang at the top. In a high building being built in one of the twin cities, enough blank wall is being added at the top to make another story, and the streets are further robbed of needful light by a projecting cornice supposed to bear something like a "classic" proportion to the building. Rooms in the upper stories of high buildings in cold weather form a part of the ventilating shaft for the lower stories, and very few of these high buildings have thus far been built so as



THE TACOMA BUILDING, CHICAGO.

placed between the two principal ones; but the engineer, dealing with iron, is less happily placed; the supports, if not continuous in one vertical plane, offend any sense of good construction. We often see cross girders supported by long ones, their ends simply resting on the lower flange, but the plan cannot be carried far without looking weak. If freedom from obstruction by iron pillars is a necessary canon of engineering, then it becomes necessary to support the roof in the manner we have described, and the principle of carrying one girder by another may be rendered artistic.—*Building News*.

Traction Over Different Pavements.

It is stated that if one horse can draw a certain load over a level road on iron rails, it will take one and two-third horses to draw the same load on asphalt, three and one-third horses to draw it on the best Belgian

to give these upper rooms other air than that which is drawn through the lower part of the building. Fireproofing is not yet well enough defined by building laws to insure very secure buildings in that respect, while at the same time fire departments and water works can do little with conflagrations in the upper parts of modern high buildings. Even if the water supply and pressure were adequate and the building itself really fireproof, the consequences from smoke in a fire occurring in the stock or furnishing of rooms must often be disastrous. As all the bearings of the question come to get a full hearing, it is more than likely that buildings of the near future will be limited in height by the right of neighbors to light and air; and the mistakes, we might say the excesses, of the most of the present race of designers will, no doubt, hasten the desired result.—*Northwestern Architect and Improvement Record*.

A COTTAGE FOR \$2,500.

We give the plans and elevations for a \$2,500 cottage by W. J. Gerrish, Somerville, Mass.

The cellar is 7 ft. in clear, first story 8 ft. 9 in. clear, second story 8 ft. 3 in. clear, attic unfinished.

Parlor, dining room, and hall stained; kitchen painted, second story finished in natural wood.

Inside ordinary stock finish. Outside clapboarded on first story, second story shingled, gables to be up and down shingled.

Dry Rot in Timber.

A report on dry rot in timber has been presented to the Standing Committee on Science of the Royal Institution of British Architects, by Mr. W. H. Bidlake. In this report it is stated that no wood which is liable to damp, or has at any time absorbed moisture, and is in contact with stagnant air, so that the moisture cannot evaporate, is to be considered safe from the attacks of dry rot. Woodwork painted or tarred before being thoroughly dried and seasoned is liable to decay through imprisonment of the moisture. Large beams should always be sawn through and reversed, so as to permit of completely drying. The ends of all timbers used in construction should be left free whenever possible, as it is mostly through the ends that moisture escapes. The stagnation of air under floors is a fruitful source of dry rot in the joists, especially if darkness and warmth are also present. The fungus of dry rot has the power of creeping over brickwork, plaster, and even glass and iron to reach woodwork at a distance. Larch appears to be better able to withstand the effects of damp than fir and pine. Wood bedded in mortar is specially liable to decay, for the water of the mortar is absorbed by the wood, and, in the process of setting, the mortar may decompose some of the organic substances of the woody fiber, especially if the lime has not been thoroughly slaked. Under favorable conditions of temperature and dryness, ill seasoned wood may stand as well as wood that has been well seasoned, but it is far more liable to decay in a warm, damp atmosphere, as it contains more fermentable substance, and affords nourishment for a far more luxuriant growth of fungus. If wood is to be creosoted, however, the sapwood is better than the heartwood, as it is more porous and absorbs the oil better. The report from which these observations are taken was made with special reference to seventeen cases of rot in timber which were submitted to Mr. Bidlake, as a mycologist, for his opinion as to the causes and possible means of preventing this kind of decay in building timber.

THE WASHINGTON BUILDING.

This beautiful and symmetrical structure, as now completed, is one of the most prominent landmarks in the city of New York. The construction of the same by its energetic projector, Cyrus W. Field, having been made possible and of practical benefit by the introduction of the elevator system, which, during the past twenty-five years, has caused almost an entire revolution in down-town New York real estate. This building is located on a site formerly occupied by the residence of General Washington, which residence was there erected in 1742. This new building was completed in the summer of 1887.

The building fronts on Broadway and Battery Place, being generally known as Number 1 Broadway, although it occupies Numbers 1, 3 and 5 Broadway, running back to Greenwich Street, and embracing a most extensive, panoramic view of the magnificent bay of New York and the Hudson River.

The building is within three to five minutes' walk of the South Ferry, with its various lines of ferries to Staten Island and Brooklyn, is immediately across the square from the Produce Exchange, and within three

minutes' walk of the Cotton Exchange, the Stock Exchange, the Consolidated Mining and Petroleum Exchange, the Coffee Exchange, the Maritime Exchange, the Sub-Treasury, Clearing House, Custom House, Assay Office, Real Estate Exchange, and therefore is near the center of finance and commerce of this city. The Sixth and Ninth Avenue elevated roads have placed a station at the very door of this building, horse cars pass the building for the river fronts on either side of New York, and the up and down town routes terminate near this place.

The Battery, facing the bay, and washed by tide-water, has always been regarded as the most healthful spot in this city. At one time it was the chosen place for the residence of wealthy citizens. From the Washington building can be obtained an unobstructed view of the Battery, the bay, the rivers on either side of Manhattan Island, Brooklyn, Staten Island, the Jersey shore, and even the broad Atlantic beyond the Hook. A grander or more varied panorama than can be witnessed from the offices of this building would be hard to find or even imagine.

Beneath, in the streets, are seen the busy throngs of commercial New York—a heterogeneous mass of hu-

building, surmounted by a grand tower, is reached. This new and crowning part of the structure adds greatly to the grandeur of the pile, and gives it that loftiness which is essential to just proportions in a design based upon such broad lines as those upon which the architect was obliged to work.

The general design is laid out on broad figures, and, taken as a whole, gives the beholder the idea of solidity and compactness which is necessary for so large a building. As partially completed, the general effect was such as not to give the structure that imposing appearance which its great height and massiveness have done.

The addition has added the necessary lightness to the superstructure, and as completed it stands a monument of the grandest type to the brain which designed it and the liberal-minded men through whose efforts it was constructed.

On the Broadway side the front is divided into five sections horizontally and five perpendicularly, two stories acting in each case as the base for general lines. Above the middle two sections rises a truncated pyramid surmounted by a fancy metal fence. The roofing in this section is well broken up to destroy the otherwise blocky effect, while each section is crowned by a gable break on the lower part of the roof.

The corner of Broadway and Battery Place is beveled into a semicircular form, and makes a complete section by itself, the bay window above the fourth story jutting out just far enough to break up the regularity of that view. The conical dome above this section is given room by beveling the corner of the roof far enough to admit the work.

The Battery Place facade is the heaviest and grandest. It is divided vertically into three sections of three subdivisions each, surmounted by gable roof jutting as on the Broadway side. The central section is of stronger outline than the other two, and is based on the grand portal or entrance door. The strong lines horizontally cut the building between the second and third, the fourth and fifth, and the eighth and ninth stories. The tower rises high above the central section of this side, and is divided into two sections, covered by a conical dome roof.

The imposing structure was erected by the Washington Building Company, a corporation of which Mr. John Lindley is president, Mr. Edward M. Field secretary and treasurer, and Messrs E. M. Field, Daniel A. Lindley, George Wadlington, George S. Scott, and John Lindley are directors.

Much might be said of this historic ground that would be interesting. About 1656 there was a market on this site for country wagons and the sale of cattle. No. 1 Broadway was built in 1745, by Archibald Kennedy, the eleventh Earl of Cassilis. The twelfth Earl of Cassilis and Lord of Ailsa was born here. Subsequently the building was occupied by Mr. Prime, and later it, in connection with No. 3, became the Washington Hotel. This hotel, so well known to old citizens of New York, held its ground amid changes in the neighborhood until its lease expired, and it was torn down to give place to the present building.

In the erection of this fireproof structure the latest and best improvements known for such work have been used throughout. It is heated by steam in all parts, but tenants can use open fireplaces if they wish. It has four large passenger elevators of the most improved Otis system, two more of which are soon to be added, and has also ample stairway accommodation.

The building as a whole is one of the most complete and well arranged structures in the city of New York. We are indebted for the foregoing particulars and for our engraving to the *Architectural Era*.

FISH may be scaled easier by first dipping them into boiling water for a minute.



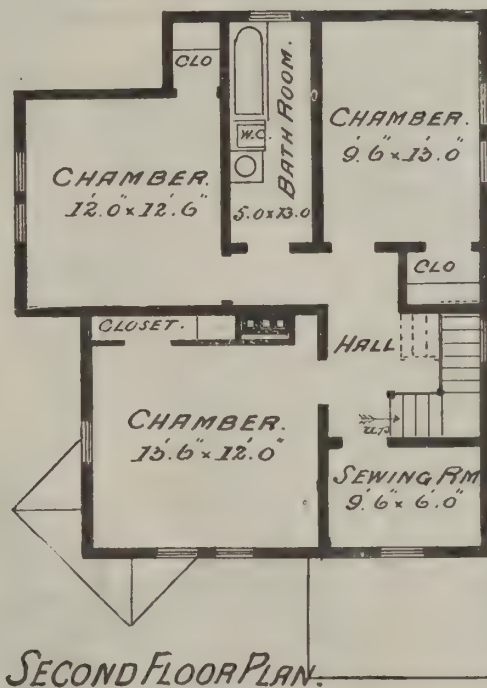
Front.



Side.



FIRST FLOOR PLAN.



SECOND FLOOR PLAN.

A COTTAGE FOR \$2,500.

manity. In the garden opposite are a hundred different types of European immigrants. From the round wooden building known as Castle Garden, a horde of newly arrived immigrants pours forth. This is the outlet, and the stream passes up into the city by the many thoroughfares, and slowly spreads out until it is lost as a special element in our cosmopolitan population. Ultimately it finds its way to the very limits of the republic, and becomes blended as a part of our American people.

This building is twelve stories in height, the walls being among the most solid in the city. The whole edifice is absolutely fireproof, well ventilated and perfectly lighted, furnishing about twenty-five acres of office room.

The building is popularly called the Field building. An examination of the interior is necessary to understand the admirable arrangement of the offices and corridors, and open courts for air, light, ventilation, and communication. Every floor is lofty, and one is impressed at all parts with a sense of amplitude.

The architect, Mr. E. H. Kendall, has shown great skill in the design, as the proprietors allowed him unbounded liberality in carrying it out.

Besides the lower floor, which is level with the streets, there are eleven complete stories before the roof of the

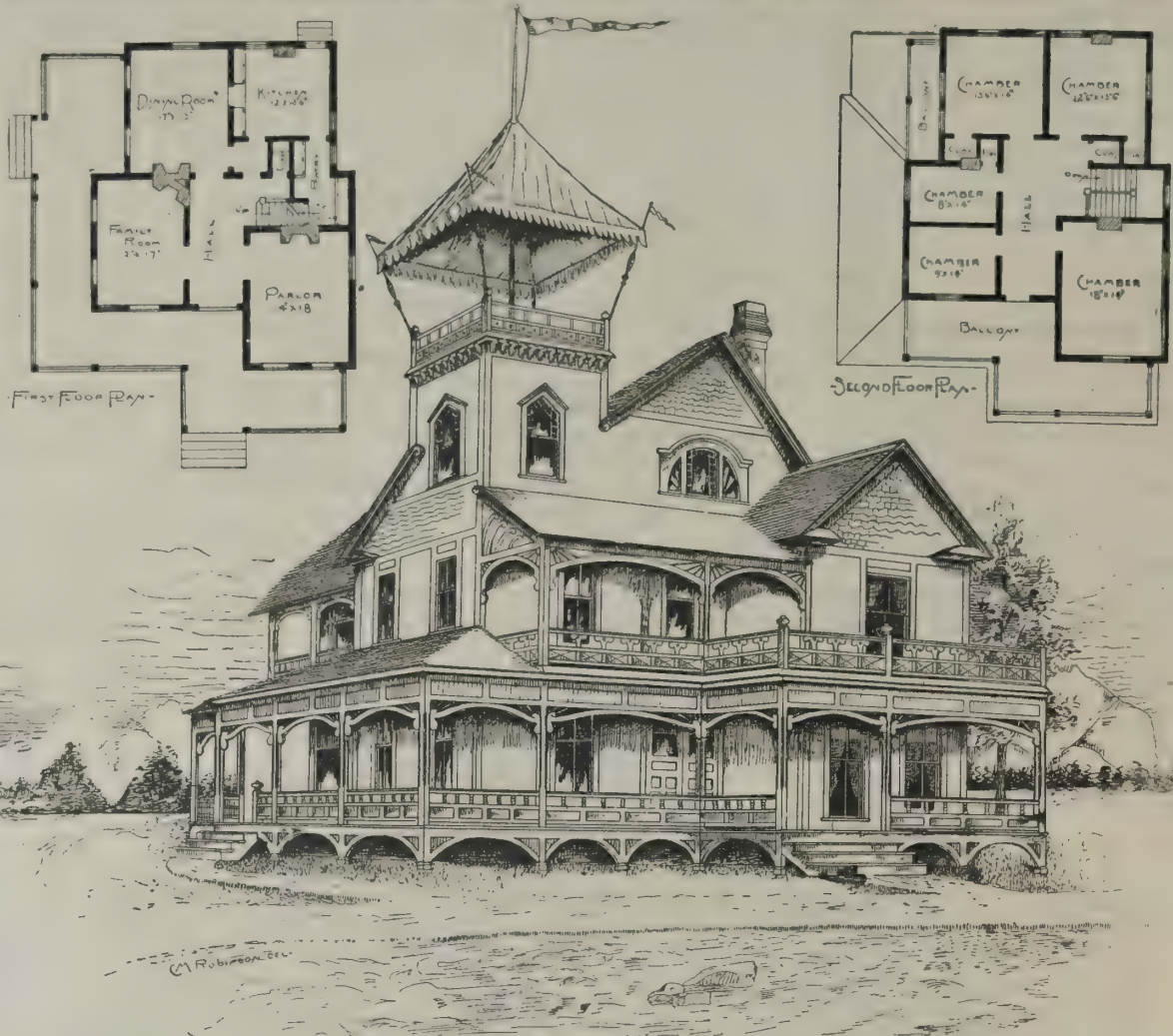
A SEASIDE SUMMER HOUSE.

This picturesque and attractive residence was designed for a seaside summer residence, or an all the year round cottage. The treatment of the elevation is most pleasing, the arrangement of the roof lines producing a very graceful effect.

The apex of the tower arranged will be a flat roof, and railing, and covered by a canvas awning as a temporary summer arrangement. The elevation of the tower affords a fine view of the surrounding country. The balconies and piazzas are commodious, which is considered an essential adjunct to a seaside cottage.

The floor plans are well arranged, the hall passing between parlor and family room. The stair being carried back gives easy access to all parts of the house. The hall gives direct communication to each room. The second story comprises five chambers, two small and three larger ones; closet room being amply provided for. There is no arrangement for bath room, or hot and cold water, etc., which is not generally required for a beach cottage. If bath room be needed, one of the smaller chambers could be used for that purpose.

Size of house: Front, 36'; side, 42'. Size of rooms, see floor plans. Height of stories: cellar 7', first story 10', second story 9'. Foundation 8" brick. First and second stories clapboarded. Gables and roof shingled. Cost about \$5,500.



A SEASIDE SUMMER HOUSE.

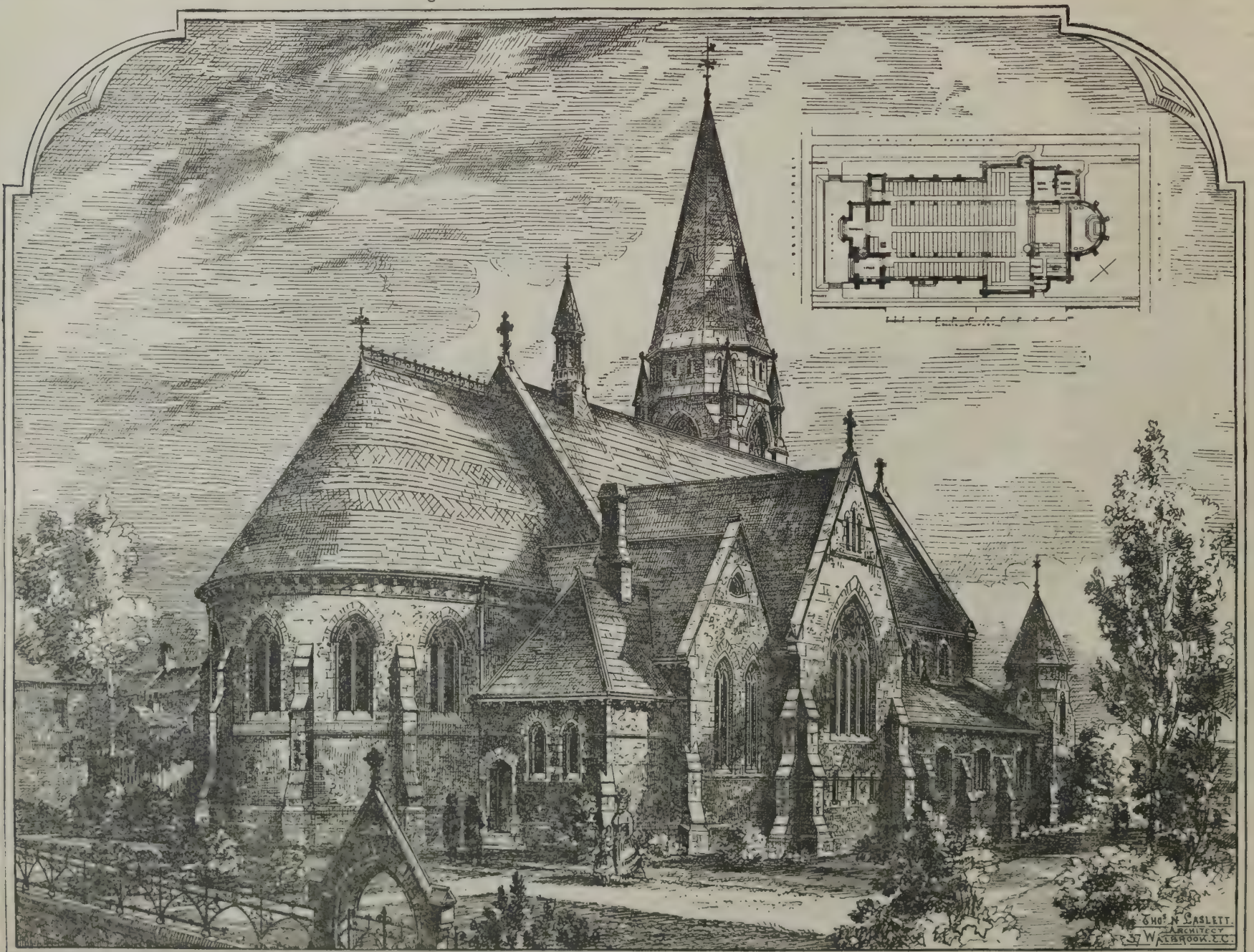
CHURCH OF ST. PAUL, LUTON.

This church, the plans for which have been prepared by Mr. Thomas N. Laslett, architect, of Walbrook House, E. C., is about to be commenced, the estimated cost, including the tower and spire, being \$32,000. It is much needed to meet the requirements of the grow-

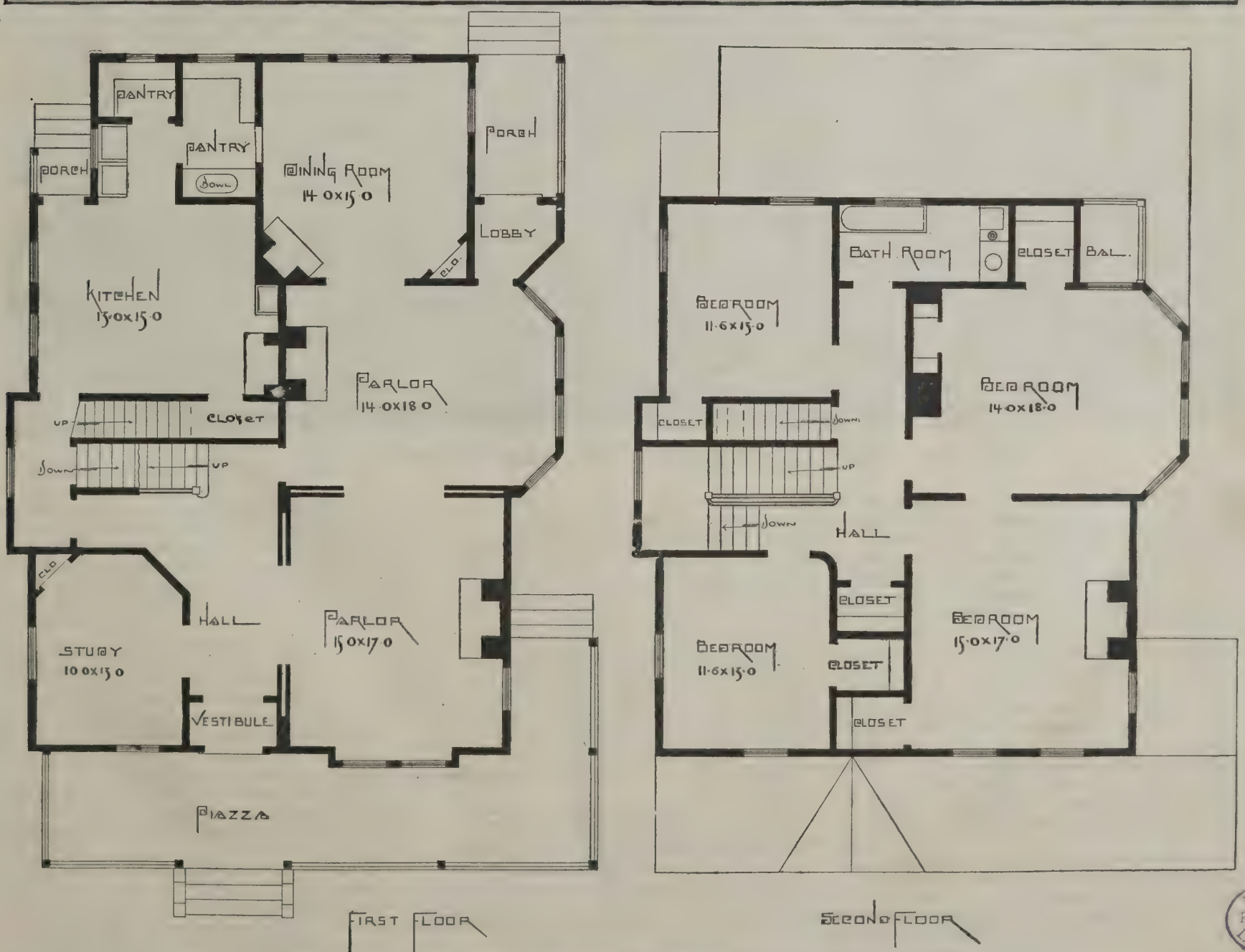
ing district of New Town, Luton. The principal dimensions are as follows, viz., nave, 97 feet by 29 feet in the clear; chancel, 40 feet by 29 feet; aisles, each, 60 feet by 12 feet; transepts, each, 26 feet by 20 feet; chancel aisle, 20 feet by 12 feet; extreme length outside, 164 feet; ditto breadth, 87 feet. Owing to the position of the site, the chancel will be to the southwest, next Arthur Street, and the tower and vestibules to the northeast, next Hibbert Street, where the principal entrances will be from a raised terrace. Separate vestries are provided for clergy and choir. The church (without galleries) is calculated to seat 900, besides 32 in the choir.—*The Architect.*

The Ancient Cataract of the Hudson.

In a lecture recently delivered in the Museum of Natural History, in this city, Professor Bickmore showed, by drawings of the coast survey, that, in the carboniferous epoch and until a later period in the age of mammals, the coast of New York extended fully 100 miles into the ocean south of its present line. The ocean steamers



CHURCH OF ST. PAUL, LUTON.



A DWELLING NEAR NEWARK, N. J.
[For description see page 10.]

ENTRANCE TO MELROSE PARK, NEAR NEW YORK.

The town of Flatbush is one of the oldest suburbs of Brooklyn, and contains many beautiful residences.

We give herewith a view of the main entrance to Melrose Park, at Flatbush, a private inclosure of several acres, in which are located several delightful dwellings. The avenue of stately trees imparts a pleasing effect, and may prove very suggestive to those desiring to improve their grounds.

Wall Plastering.

Among all the improvements in building methods and materials, it is strange that so important a factor in the construction of a building as wall plastering should have stood still so many years. For some years past, however, the common mortar in ordinary use has not been standing still, but has, on the contrary, been growing worse and worse each year. One reason for poor mortar is carelessness in making up and seasoning, but the chief cause is the use of lime made from limestone, which is very hot, and even with the great-

we cannot say, but think it quite probable that it is one of the ingredients.

Sawdust is now much used in mortar, where it forms an excellent substitute for sand. In some localities it is impossible to obtain good, clear, sharp sand suitable for use in the composition of mortar, but sawdust is always to be had in almost unlimited quantities. The latter has the advantage of being lighter, and renders the mortar not only easier for the laborer to carry, but, being only half the weight of that mixed with sand, is much better for ceiling, as it is less apt to fall off. Mortar made of quicklime and sawdust in place of sand, and mixed with a proper proportion of cement, makes an excellent mortar for brick or stone work. Sawdust enters largely into the patent plasters.

By the use of these new inventions in plaster, rapid building is greatly facilitated, as there is no waiting for mortar to season; the composition, being all prepared, has only to be mixed with water, when it is ready for use. There is also no delay in waiting for the plastering to dry, as it dries immediately and soon

A HOUSE FOR \$5,500.

Our engravings show floor plans and perspective, the latter prepared direct from a photograph of a house lately erected at Flatbush, Long Island.

This house is arranged to occupy a fifty foot lot, allowing five feet on one side and ten feet on the other.

The cellar is 7' high, and the first story 9' 6", second 9'.

There is a cemented cellar under whole of house; the foundation walls are of stone, the underpinning is of cut bluestone, laid up in white mortar.

The frame is covered with matched sheathing, and then beveled white pine clapboards are laid. The first story is painted tile red, while the second story is light brown. Slate roof.

On the first floor are parlor, sitting room, dining room, kitchen, hall, and butler's pantry, china closet, and lobby.

Open fireplaces to parlor and sitting room, provided with tile hearths, neatly laid, and neat and artistic hardwood mantels in cherry.

Sliding doors are provided between the principal

**ENTRANCE TO MELROSE PARK, NEAR NEW YORK.**

est care refuses to slake evenly. This heating quality causes the disagreeable effect known as "pitting out." The tiny lumps of lime in the plaster, which refused to slake before being applied to the wall, swell as they come in contact with the air, burst and fall off, so that many a job of plastering, which seemed at the time of finishing to be a first class piece of work, has looked after a few weeks as though it had been afflicted with the small-pox. Lime made from shells is much cooler, and therefore better for the manufacture of plaster than that made from limestone, but in a limestone country the latter is of course cheaper, and is therefore more generally used. The recent valuable inventions in wall plaster mark a new era in the history of building, and bid fair to revolutionize that branch of the business. The ancients were thoroughly acquainted with the secret of manufacturing a perfect and durable mortar, specimens having been found in these modern days which have stood the test of ages and still retain the firm and enduring qualities of the hardest stone. "There is nothing new under the sun," and perhaps the recent inventions are but the recovery of a lost art.

Saccharine matter is said to have entered largely into the composition of ancient plaster, and is also more or less used at the present day for special occasions; whether it enters into the new plasters or not

becomes as hard as stone. The plasterer can therefore be directly followed by the inside finishers.

Previous to the introduction of the new varieties of plaster came improvements in the styles of lathing, and there are now many excellent kinds of metal lathing upon the market, each laying claim to some special advantage over all others.

With the new styles of plaster and metal lathing, and by incasing floor beams and posts in fire proof cement, and filling all interstices between walls and floors with "mineral wool," it is possible to-day to make even a frame house practically fire proof; particularly if, in addition to other precautions, the roof be of slate or metal, preferably the latter, as slate is apt to crack and break if subjected to intense heat.—*Architectural Era.*

A DWELLING NEAR NEWARK, N. J.

Our engraving, prepared direct from a photograph of the building, shows a residence at East Orange, N. J., recently erected at a cost of about \$5,500. The exterior appearance of the house is very pleasing, and the interior arrangement convenient and excellent. The general dimensions will be understood from the plans, while the exterior details and forms are shown in the photographic engraving.

rooms, so that the rooms may be thrown into one; the trim throughout is of cherry, and the door and window casings beaded and band moulded.

The butler's pantry between dining room and kitchen is neatly fitted up with shelves and drawers complete; the kitchen and lobby are wainscoted with narrow, beaded, white pine, finished with a neat, moulded cap; the lobby, which is used as a protection against the weather, is large enough to admit ice box.

The front hall is finished in whitewood, natural, contains a pretty staircase with newels, posts, balusters, and rail, all neatly turned out of whitewood; second floor has three bedrooms, besides bathroom and servant's room; all provided with ample closet room.

The bathroom is neatly wainscoted.

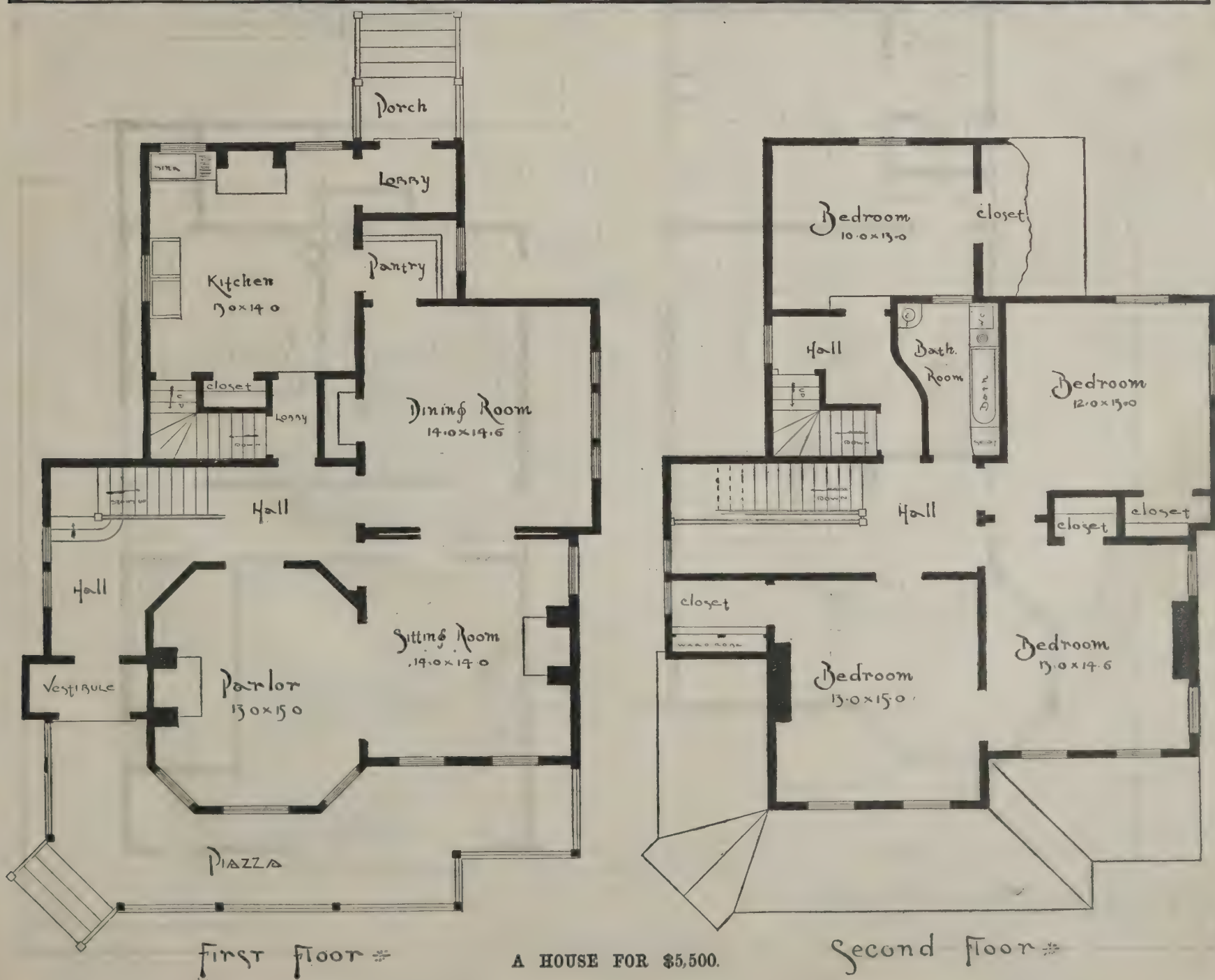
The servants' staircase and hall can be shut off entirely from the rest of the house.

In the attic three good-sized bedrooms could be finished off if required.

Ceilings are all neatly corniced, and flower pieces in centers.

Cost of the building, \$5,500.

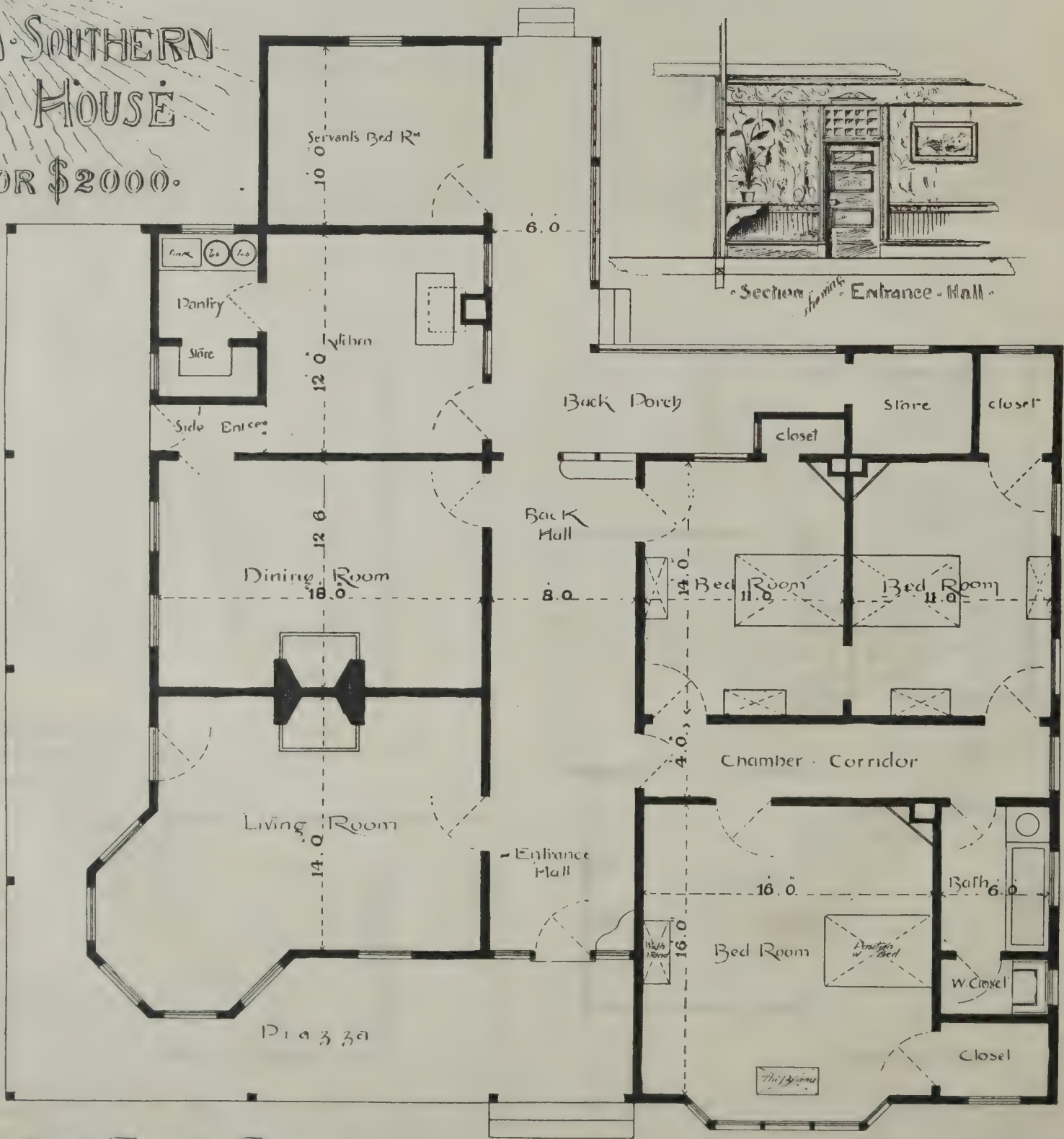
For sticking paper to zinc.—Use starch paste with which a little Venice turpentine has been incorporated, or else use a dilute solution of white gelatine or isinglass.





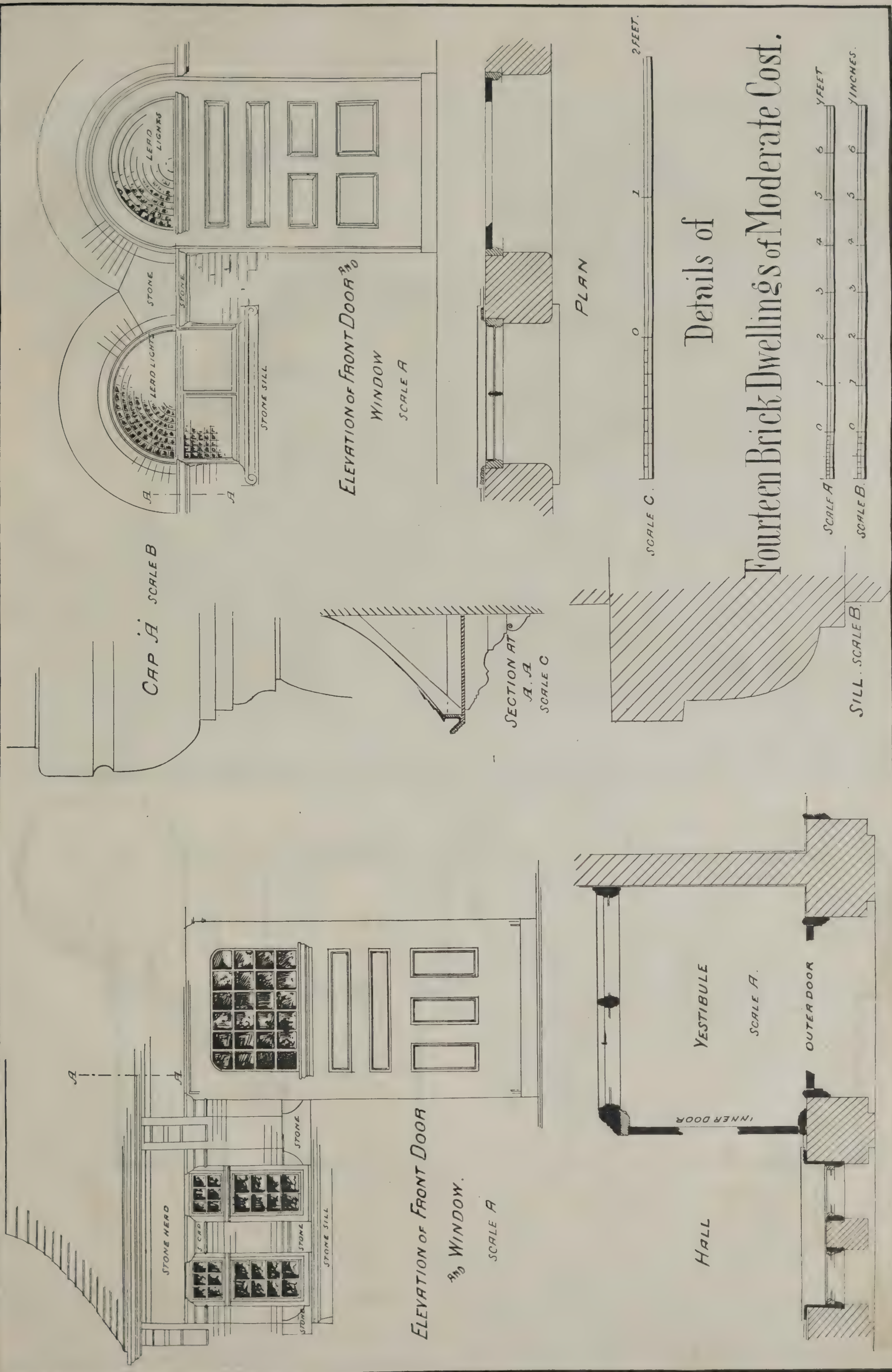
THE FRONT VIEW.

A SOUTHERN
HOUSE
FOR \$2000.



PLAN & FIRST FLOOR





A RESIDENCE AT EAST ORANGE, N. J.

This house was lately built at East Orange, N. J., at a cost of \$5,400. This design combines pleasing elevations and convenient floor plans.

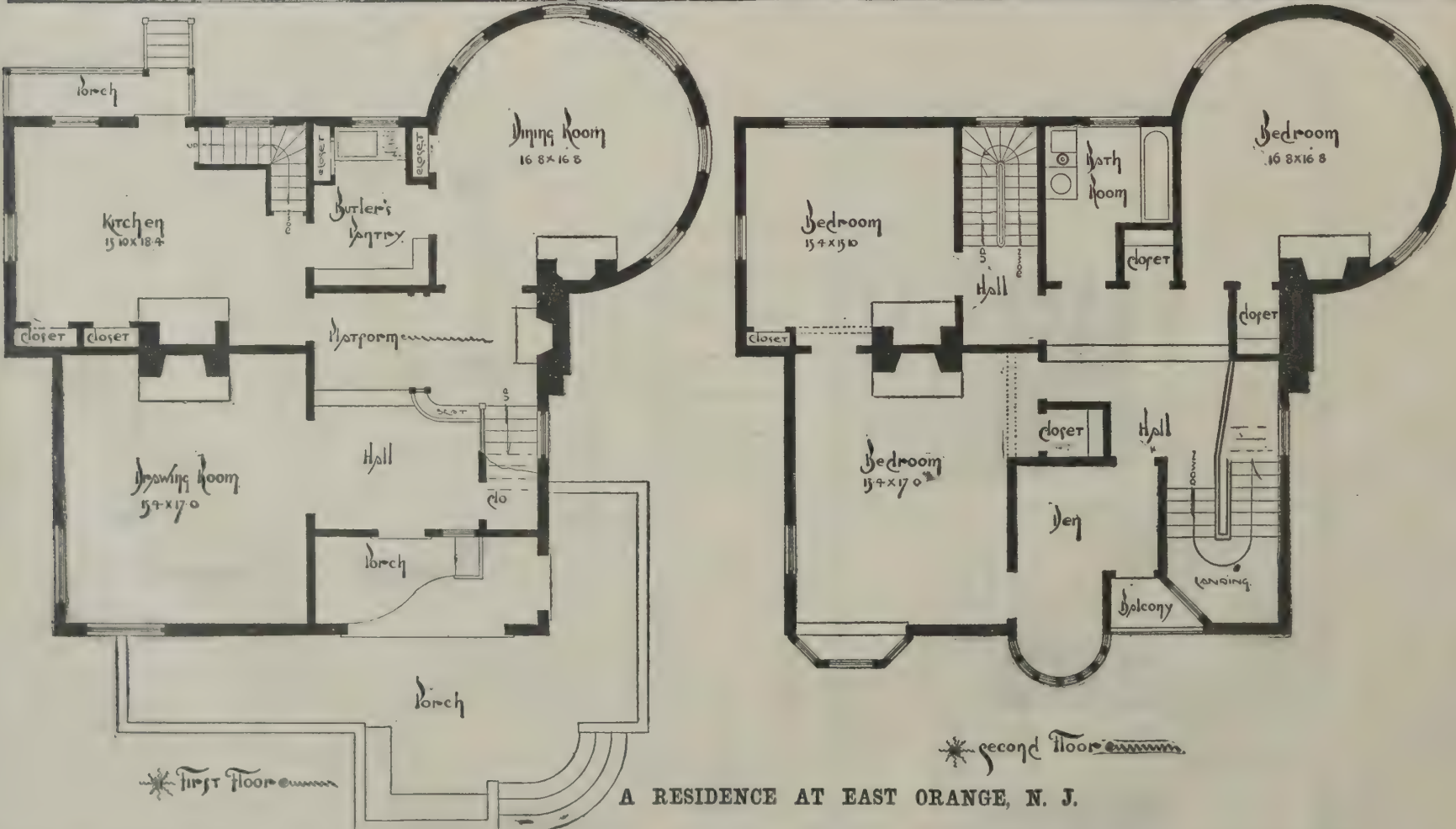
The exterior has a very peculiar appearance, as the bricks used for the facing are of a rich dark brown color, spotted with iron patches, laid at random in

The first floor shows porch at front, with a balustrade, built up similar to brickwork and coped with bluestone.

The hall is finished in oak. There is a very handsome staircase, with newels, posts, balusters, and rail, all neatly carved and turned. The main landing has a seat, and window glazed with stained glass. The fireplace on this landing is faced on checks, jambs, and

form a very pleasing feature in the elevation, is the means of providing a large dining room, well lighted, the windows commanding extensive views of the surrounding country. This room has an open fireplace, china closet, etc.

The kitchen is ample and neatly wainscoted with narrow beaded stuff.



A RESIDENCE AT EAST ORANGE, N. J.

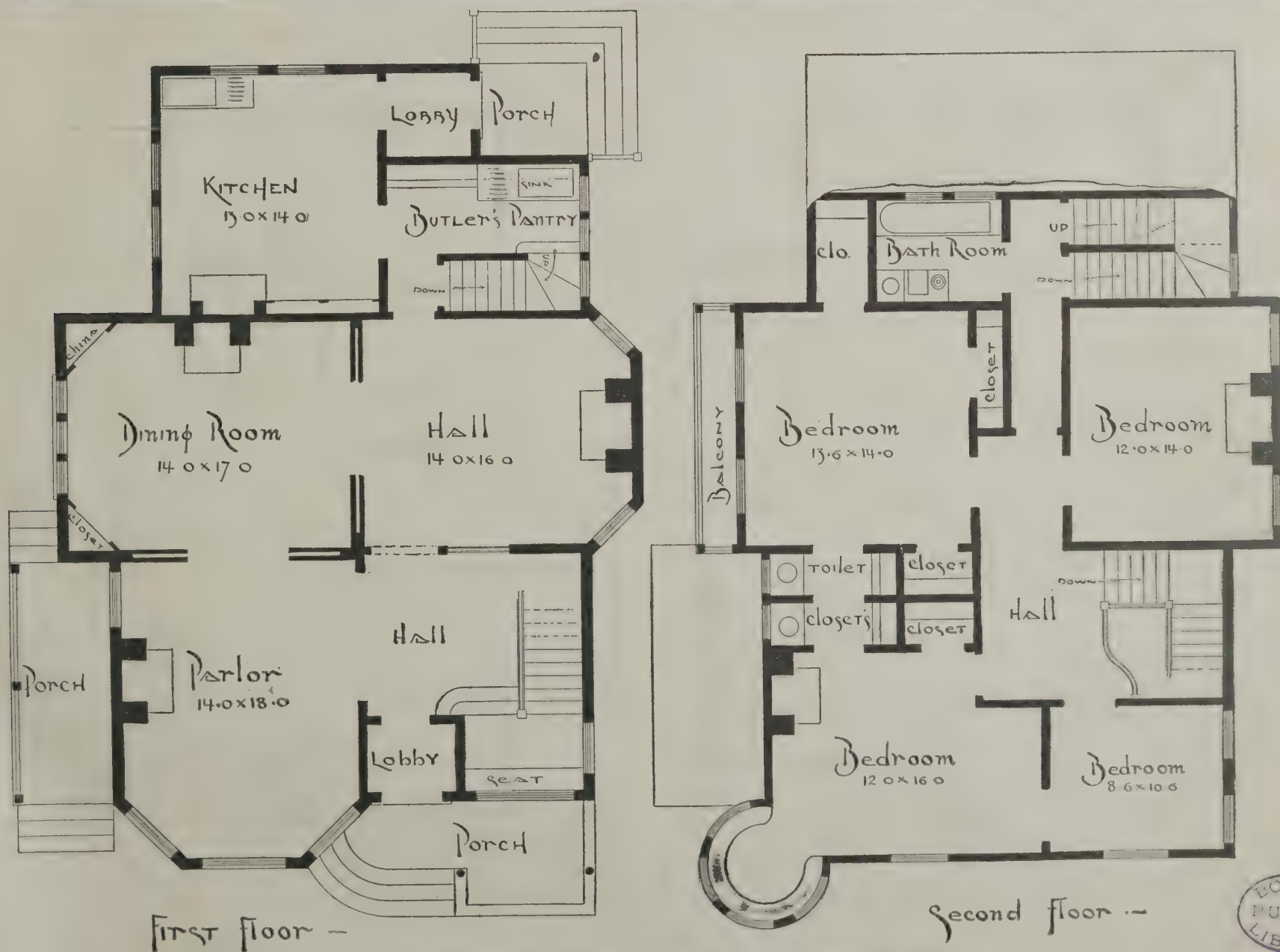
black mortar, with a backing of hard Jersey bricks. The chimneys, door and window jambs, and all quoins are finished in red brick, with a neat red joint. Bluestone is used throughout. The kitchen mantel and hearth are of the same. The fireplaces in laundry and kitchen are built of Trenton pressed bricks. The cellar has a cement floor, and contains coal bins, laundry room, all fitted up in the best manner.

front with Trenton pressed bricks, which are also used for all hearths throughout. The trim throughout is of hardwood, the door and window casings being neatly beaded and moulded, with corner blocks at angles. The drawing room is large and well lighted. There is a pleasant open fireplace, with hardwood mantel. The tower at corner of building, which is made to

Three bed rooms on second floor, with closets. The den is a pleasant little room, with door opening out upon balcony. The bath room is neatly wainscoted and supplied with the modern improvements. Two rooms finished off in attic. This house cost \$5,400 to build. Our engraving is made direct from a photograph of the building, taken especially for the SCIENTIFIC AMERICAN.



A SOUTHERN HOUSE FOR TWO THOUSAND DOLLARS.



A QUEEN ANNE COTTAGE AT FLATBUSH, LONG ISLAND.

[For description see page 17.]



A COTTAGE NEAR BROOKLYN, N. Y.
[For description see page 17.]



A COTTAGE NEAR BROOKLYN, N. Y.

We give herewith a perspective and floor plans of a cottage lately built at Flatbush, near Brooklyn, N. Y. Our engraving was prepared direct from a photograph of the building taken especially for the SCIENTIFIC AMERICAN.

There is a cemented cellar under whole of house; the frame is sheathed and covered with beveled white pine clapboarding and shingles. First story is painted light brown, second story a tile red, and the roof red.

The trim throughout is of cherry, except hall and kitchen, which are finished in whitewood; the door and window casings are all neatly beaded.

The hall contains a pretty staircase, with newels, balusters, and rail all neatly turned out of whitewood; the parlor and sitting room are well lighted, provided with open fireplaces, with tile hearths and artistic mantels in cherry.

The kitchen and lobby are wainscoted with narrow beaded whitewood and finished with a neat moulded cap.

Three good sized bedrooms on second floor, amply provided with closets.

The bath room is wainscoted and provided with all the best conveniences.

The servants' hall and staircase, also bedroom, are all neatly fitted up, and arranged to be separated from the rest of the building.

Three bedrooms could be finished in attic, if desired.

The walls are all plastered and the ceilings neatly corniced, with flower pieces in centers.

The house cost \$6,000.

AN ENGLISH COTTAGE.

We give from the *Building News* a design for a cottage by F. W. Fryer, architect. The elevations are pleasing and the interior arrangement convenient. The house can be built for between four and five thousand dollars. A study of the elevation and plans will reveal several desirable features.

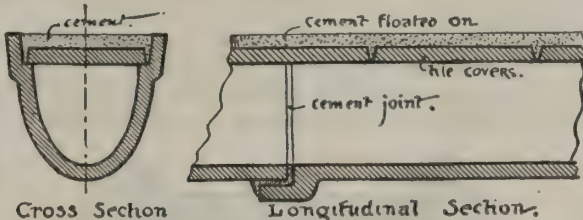
Mineral Wool as a Filling.

The use of mineral or slag wool is becoming very general as a filling for floors. It is also a protection against the spread of fire. The experiments conducted by Mr. H. H. Stanger, C.E., London, England, prove that a body of the slag or wool, say one inch thick, does not become incandescent when subjected to intense heat, only the parts in immediate contact with the flame being fused, leaving the rest intact, and even when heated through by long subjection to heat there was no radiation, a thermometer held within one-fourth of an inch not varying in the least. The Liverpool theaters have the drop curtains lined with this material, and recently a patent has been obtained for weaving the slag wool into curtains both for theaters and other buildings.

If any of our readers have made an invention for which they have thoughts of taking a patent, they are invited to communicate with Messrs. Munn & Co., the publishers of this paper, who for a period of forty-three years have conducted a most successful bureau in this line. A pamphlet of instructions will be sent free, containing full directions how to obtain a patent, costs, etc. In very many cases, owing to their long experience, they can tell at once whether a patent probably can be obtained; and advice of this kind they are always happy to furnish free of charge. Address Munn & Co., SCIENTIFIC AMERICAN office, New York.

A NEW FORM OF DRAIN PIPE.

In a letter to the *Builder* of late issue, Mr. R. Norman Shaw, R.A., London, suggests a new form of drain pipe which presents some advantages, and we give the sketch and an extract from the accompanying letter. The certainty in making the bottom joint in such a drain, and the fact that the joint may be made even and struck smooth, are undoubted improvements. The joints in the tile covers may be rabbeted to insure against penetration of mortar.



"I beg to lay before your readers a new form of drain pipe, which I venture to believe will obviate all difficulties. Instead of the ordinary socket-jointed circular pipes, I use a culvert of an egg-shaped section, open all along the top, and with a rabbeted flange to receive covers. About the laying of these culverts and cementing the joints there is no difficulty of any kind, and when laid they can be inspected from end to end, each joint examined, and the uniformity of the fall tested to the utmost nicety. Should an imperfectly laid culvert be detected, it is easily taken out and another put in its place (we all know the difficulty of getting out a defective socket-jointed pipe, and the bungling mess that ensues when this is necessary). When the culverts are found to be all well laid, and when the whole has been examined, the loose covers are laid in and pointed with cement, and then the whole floated over with Portland cement, as shown in sketches. It will be seen at a glance that a perfect drain has been

made of the best possible section and with the least possible trouble. If at any time a drain requires examination, it is at least as easy a thing to cut through the cement bed, and chip out a covering tile, as to cut a hole in a drain pipe, as we now have to do; but I maintain that the vast majority of our troubles arise from drains not having been laid properly in the first instance. If well laid to begin with, and flushed at intervals, I cannot see that a drain ought to require attention for many years."

A QUEEN ANNE COTTAGE AT FLATBUSH, LONG ISLAND.

This charming little Queen Anne cottage, of which we give an engraving, prepared direct from a photograph of the building, has lately been built at Flatbush, Long Island.

The elevations are all pleasing.

There is a cemented cellar under whole of the house, which contains coal, wood, and furnace rooms, besides laundry fitted up with wash trays supplied with hot and cold water.

The foundation walls are laid up in stone, and the underpinning and the first story, except kitchen, is of brick neatly laid up, the exterior being shingled and painted green, while the roof is shingled and painted tile red.

The door and window sills are of brownstone, and the steps and front porch also of same.

The lobby is wainscoted, paneled, and finished with a neat, heavy moulded cap.

The hall and reception hall, back, are finished in ash, and between these two halls is a partition which forms two arches, one forming a door or passageway, while the other is neatly filled in with a spindle screen; the staircase in front hall is handsome, has newels, posts, balusters, and rail, carved and turned out; the reception hall has an open fireplace, laid with a neat tile hearth and a handsome mantel.

The parlor is a pleasant room, and has a window that runs down to floor and opens out upon the porch at side; this room has an open fireplace, tile hearth, and has hardwood mantel; all the woodwork in this room is of mahogany.

The dining room is finished in old English oak, and the walls are neatly wainscoted in panels and finished with a handsome carved and moulded cap; the open fireplace has tile hearth and a very handsome antique oak mantel.

From the butler's pantry, stairs lead to cellar and attic.

The kitchen is neatly wainscoted, supplied with hot and cold water.

There are four bedrooms, all cheerful and provided with ample closet room, with shelves, drawers, etc.

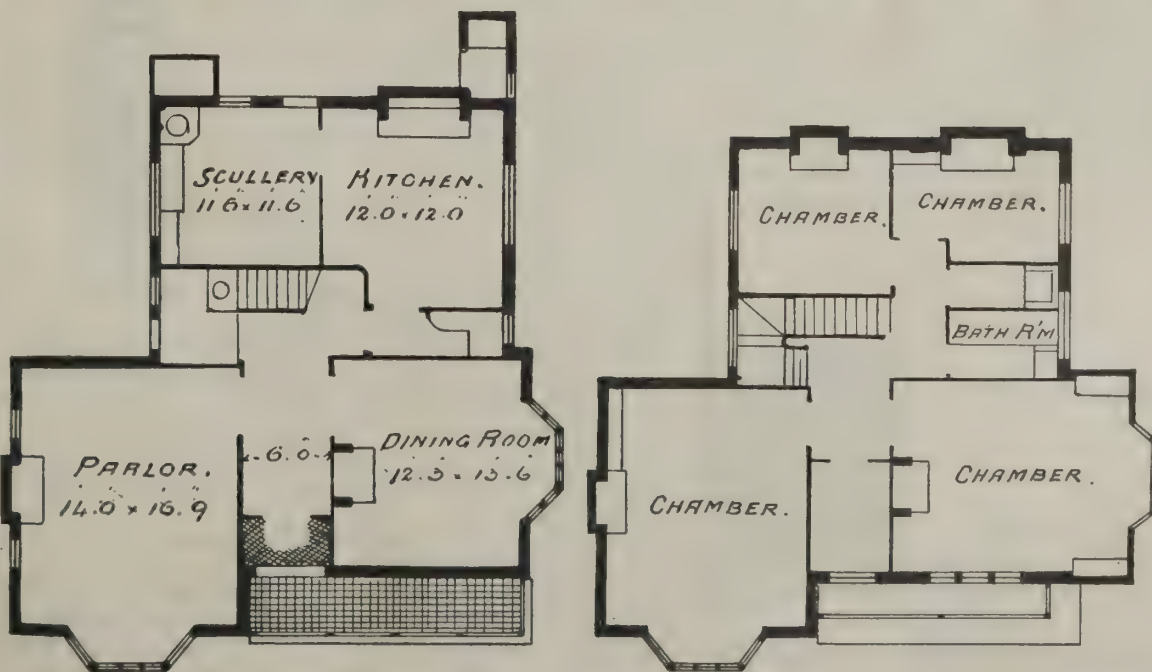
Two rooms have toilet closets fitted up with wash bowls supplied with hot and cold water; there are two rooms that have open fireplaces, tile hearths, and neat and artistic mantels.

Three rooms are finished off in attic.

This house cost \$8,000 to build.

Natural Gas Lighting.

From Alexandria, Ind., to Anderson is twelve miles, along the turnpike. The pike runs through a wealthy and thickly settled community, and the farmers are already well supplied with gas from wells that they have drilled on their farms. They have for some time kept flambeaux burning all night in front of each house for the convenience of travelers, and now they propose to reduce the thing to a system and establish a regular line of lights for the whole twelve miles. All that it will cost will be the laying of a little tubing to get the lights at regular intervals.



FIRST FLOOR PLAN.

SECOND FLOOR PLAN

AN ENGLISH COTTAGE.



Lane's Patent Door Hanger.

This hanger is anti-friction, the load being carried by the small steel axle of the wheel; this axle resting under parallel ways of the hanger, while the periphery of the wheel follows the track. The axle being many times smaller than the wheel allows the door to open its whole width, while the axle only rolls the length of the ways which rest upon it.

Lane's improved steel track is made of flat steel, $1\frac{1}{4}$ by $\frac{1}{8}$ inches in size, and is supported in position by hollow iron brackets which are each fastened to the building by a single screw at distances corresponding to the holes in the track, and when so fastened a common coach screw or carriage bolt is put through the hole in the track, passing also through the bracket into the building, making a very strong fixture, and of neat appearance.

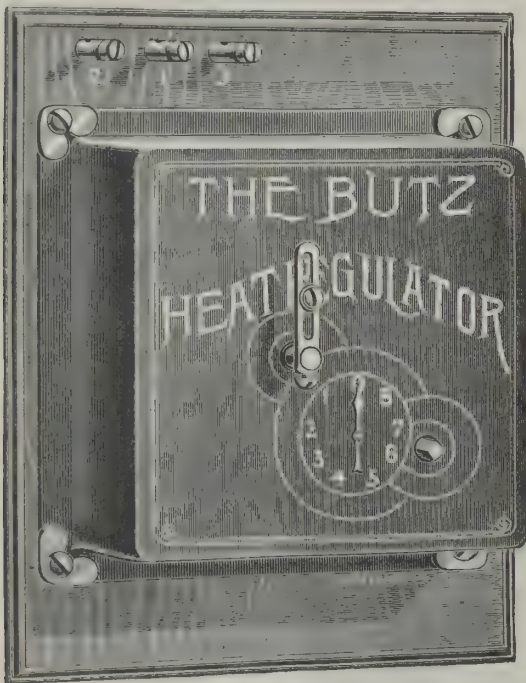
The lower edge of the track is even with that of the brackets, and the door being hung beneath them as near as possible without contact, *effectually prevents derailment.*

This track requires no boxing or elaborate roofing, as snow, ice, or other matter cannot lodge to prevent working, and there is nothing to decay, and the swelling and shrinkage which apply to all wood tracks is avoided.

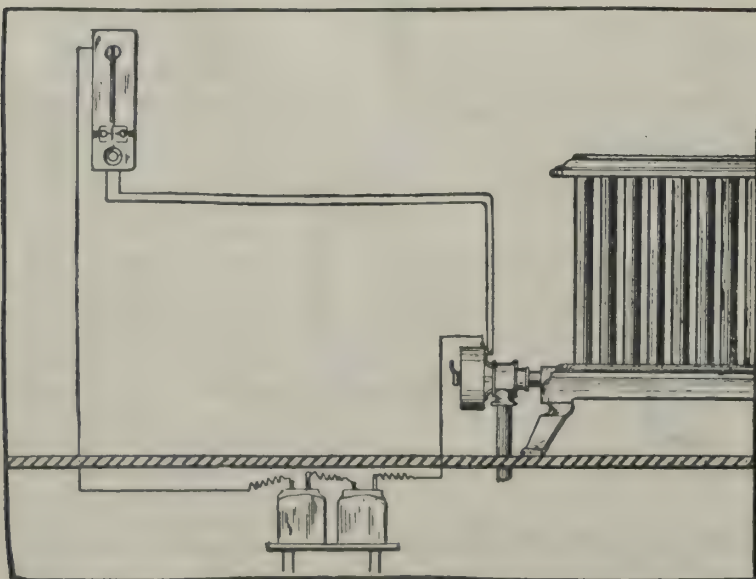
Those in need of such articles should address the manufacturers, Lane Bros., of Poughkeepsie, N. Y., for their fully illustrated catalogue. They also make coffee mills, self-measuring faucets, etc., and their goods have been staple articles with the hardware trade for years.

AUTOMATIC TEMPERATURE REGULATORS.

Any of the modern improved systems of heating buildings, by hot air, steam, or hot water, is lacking in completeness unless also fitted with means for automatically controlling the work of the furnace, and thus regulating the temperature. The Consolidated Temperature Controlling Co., of Minneapolis, Minn., have a perfected automatic electric regulator, illustrated herewith, which can be as readily applied to one heat-

**THE MOTOR.**

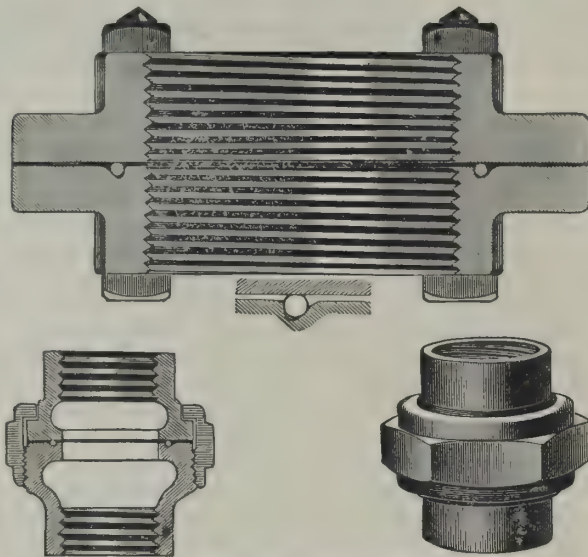
ing system as another, and which has proved highly successful in several years of practical use. The regulator consists of a thermostat, or mechanical thermometer, placed in a room whose temperature is to be regulated, this thermostat being connected by electric wires with an ordinary open circuit battery which may be placed in the furnace room or basement. A strong spring motor is arranged near the furnace, this motor

**AUTOMATIC VALVE FOR RADIATORS.**

being connected with the front and check dampers, so that as one is opened the other is closed, the electric wires from the battery and thermostat connecting with the motor. The automatic electric steam valve is a device the company has provided for controlling, automatically, the temperature of a room by regulating the admission of steam to the radiators or heating pipes. It has an electric motor connected with a thermostat and battery, and is absolutely automatic, requiring no winding, the valve closing when the temperature rises above a certain degree and opening as the temperature falls below it.

THE PRINDLE METALLIC WIRE-PACKED UNIONS.

In the accompanying illustrations are shown some uses of metallic wire packing in connection with mal-

**PRINDLE'S METALLIC WIRE-PACKED UNIONS.**

leable or cast or gray iron unions for pipe fittings, the packing being the invention of Mr. John A. Prindle, Secretary and Treasurer of the Worswick Manufacturing Co., of Cleveland, Ohio. Brass spring wire is preferably used for the packing, for which a groove or seat is made in the couplings, as shown in the sectional views. The wire ring is made with open ends conforming in size and shape to the recess, the shape of which is such as to contract the wire ring when the latter is pressed into the former, thus making a perfect joint with less pressure than is required with most other kinds of packing. These packings cannot blow out with any internal pressure, and are as permanently durable as the material of which they are made.

Filling the Hollow Spaces in Walls and Floors of Buildings.

According to the best methods of construction, all hollow vertical flues and open spaces in walls or partitions of buildings should be completely closed and filled with some non-conducting, non-burning material, such as mineral wool or a similar substance. All manner of communication, by hollow passages, from one story to the next above, should also be cut off by so-called "fire stops," consisting in rows of bricks laid in mortar between the furring studs of brick or stone buildings, or in the hollow spaces of the outer studs of frame structures, filling completely the whole space from the outside of the wall to the interior finish, wainscoting or baseboards. Additional safety may be gained by substituting for the ordinary lathing stout wire lathing or netting. The hollow spaces between floor boards and the lathing and plastering of ceilings accumulate dirt and dust, and are objectionable, not merely from a sanitary point of view, but principally on account of the increased danger in case of a fire.

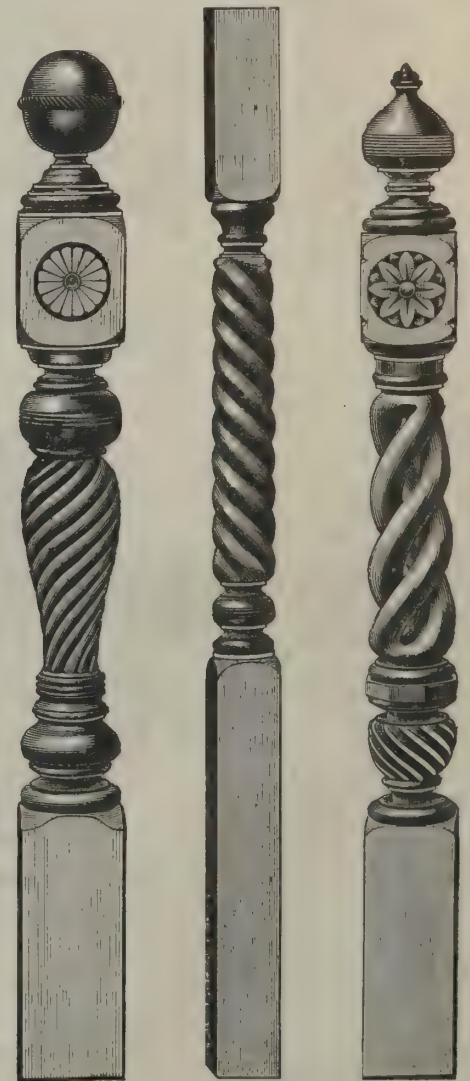
How often in inspecting them do we find them filled with chips of wood, shavings, painters' rags, or other inflammable building rubbish, which should never be allowed to accumulate, much less to be used for sound deadening. These places, moreover, form the hiding places of vermin and mice and rats. The latter, which have a well known taste for phosphorus, often accumulate unburned matches, which are readily ignited by rubbing and gnawing, and thus the origin of many mysterious fires may easily be explained. Rats and mice also gather oily waste and greasy rags, and the spontaneous combustion of such material causes, according to Mr. Atkinson, even more fires than are caused by matches. To avoid all this, all horizontal spaces between floor joists should be closed by completely filling in from the sill or girders upon which the floor joists rest to the wall with concrete plaster or mineral wool. The details of such improved building construction as have been referred to should form a part of the builder's specifications for all classes of buildings.

Terra Cotta Lumber.

For the past year a company has been working at Brunswick, near Melbourne, Australia, in the manufacture of a new material known as terra cotta lumber. This material consists of a combination of clay and sawdust. On the clay in the pit is laid hardwood sawdust, and this is allowed to remain there for thirty-six to forty days to allow the sawdust to sweat. The clay and sawdust are then elevated together to a steam crusher and stone separator, a powerful machine which ejects all stones and knits into one substance the two elementary materials, which are then passed on to the pug mill, where the admixture is rendered as thorough and complete as possible. Thence it is dropped into a press and comes out in whatever shape is required, and is then taken on a continuous band up to the steam drying house. After being dried there, they are passed into the kiln, where they are for two days exposed to very high temperature, keeping them at, it is said, a white heat. During this exposure the sawdust is consumed, and a strong porous material is left. This material is terra cotta lumber, and is guaranteed to be fireproof, proof against heat and cold, and against vermin. It is made in any size. The cost of the material per cubic foot is about the same as bricks, but there is a saving of 50 per cent. in the labor of erection and quantity of mortar used. The terra cotta lumber is worked into blocks for fireproof floors for heavy warehouses and public buildings; as a roofing material, it possesses the advantage of non-conductivity. It can be secured or nailed into whatever position is required, in the same way as timber.—*Australian Builder and Contractor's News.*

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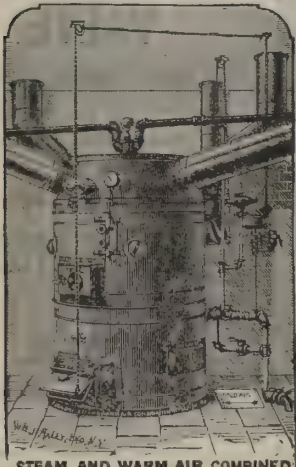
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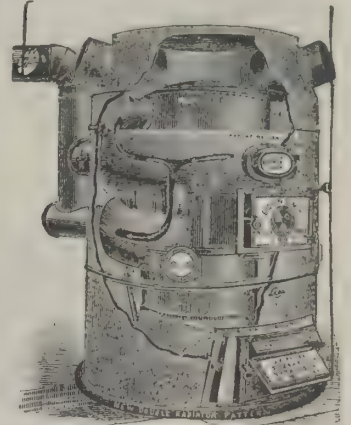
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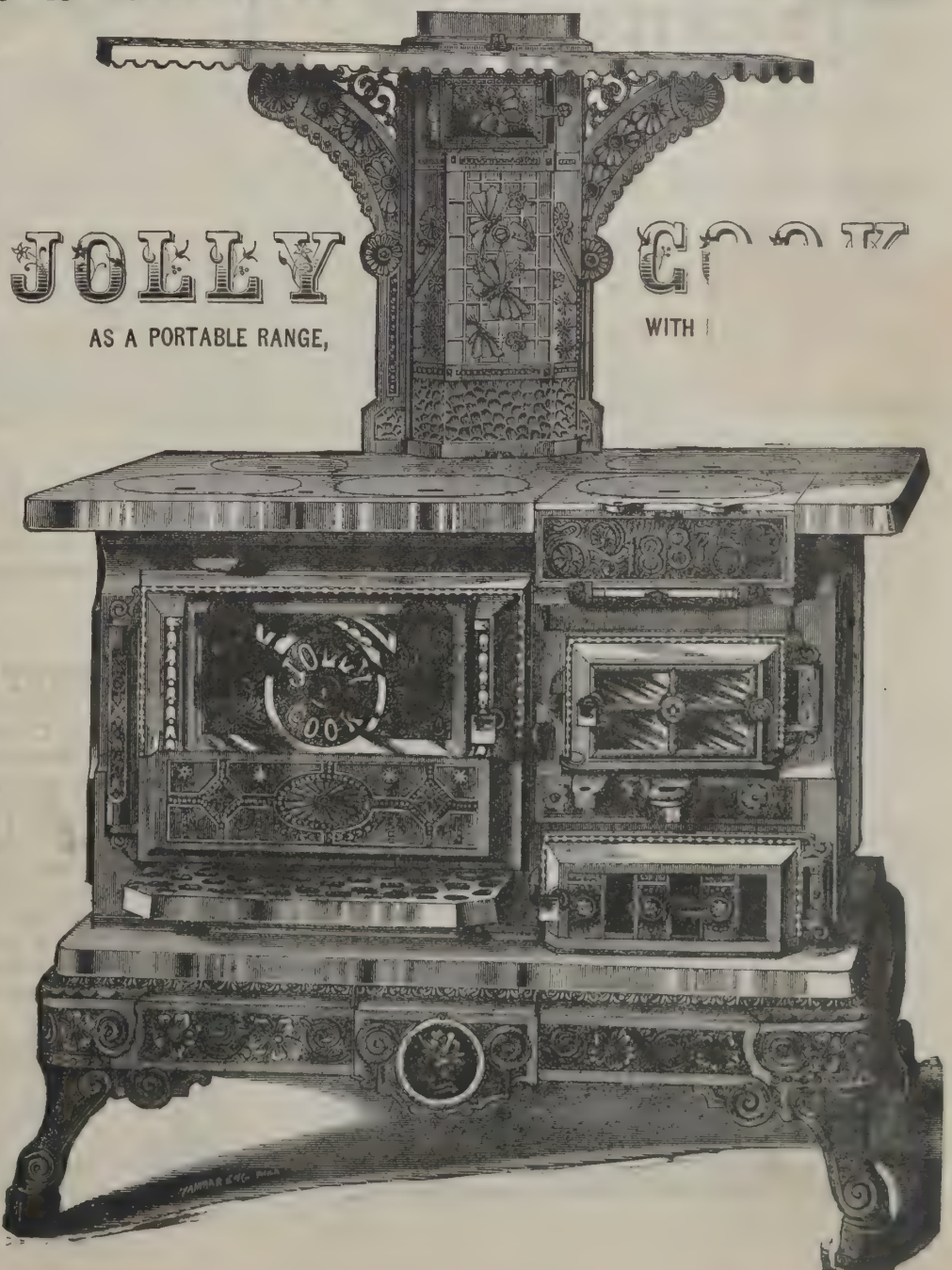
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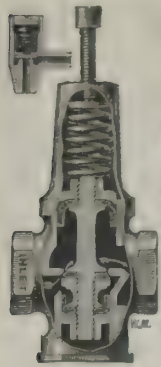
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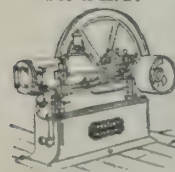
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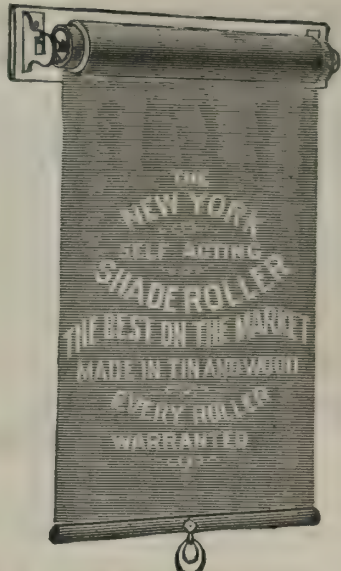
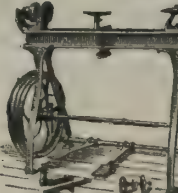
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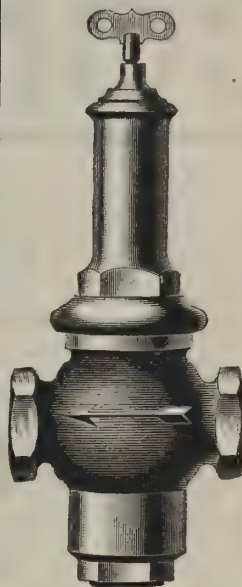
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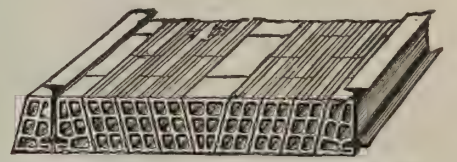


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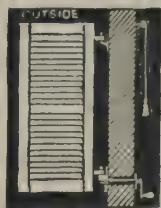
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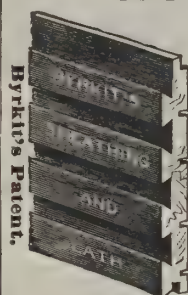
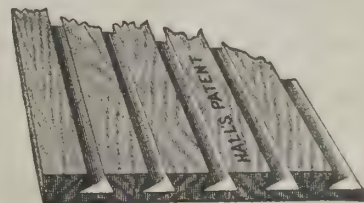
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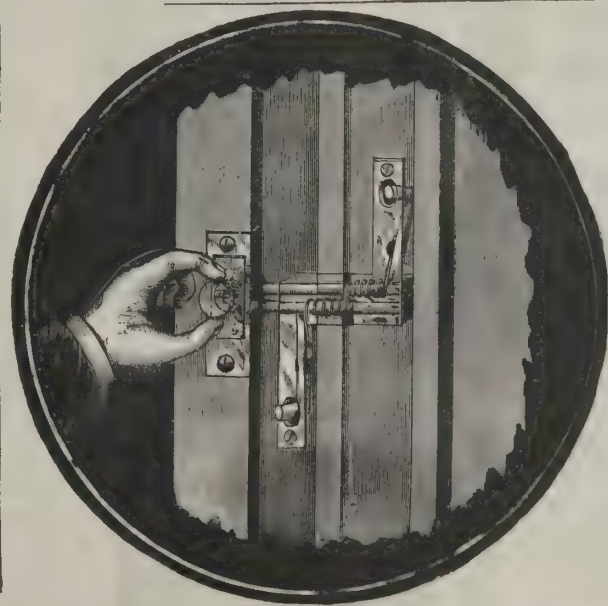
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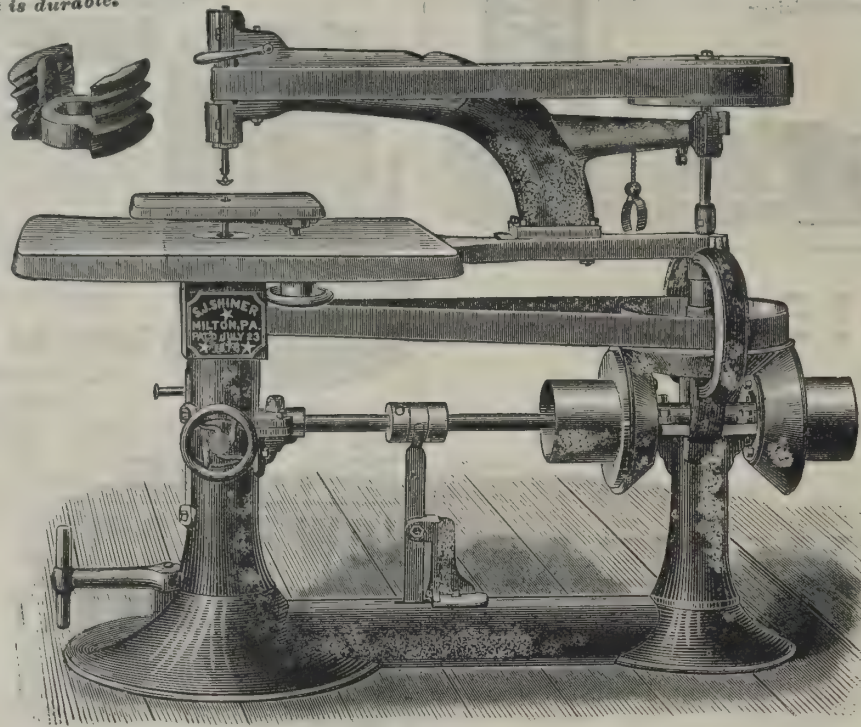
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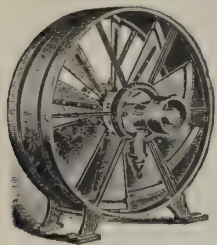


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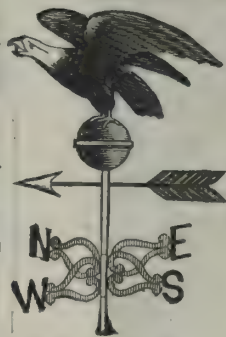
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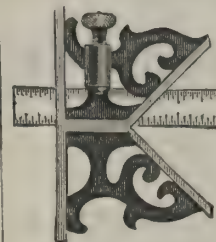
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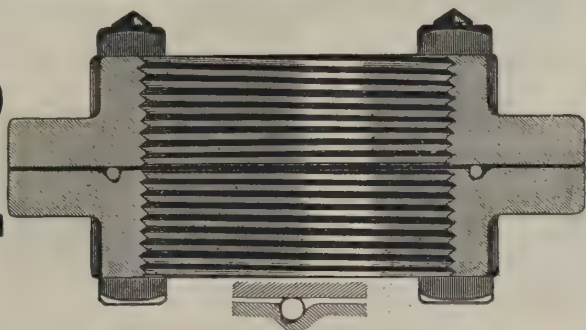


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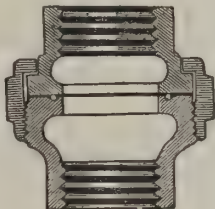
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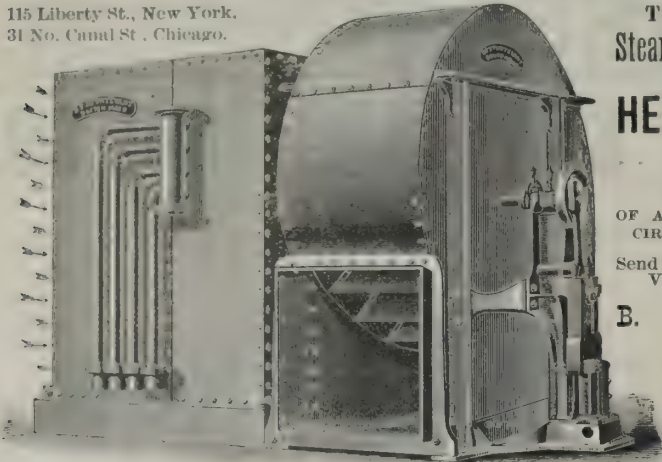
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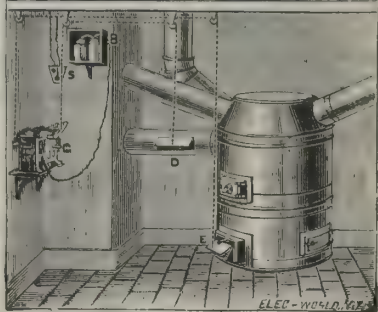
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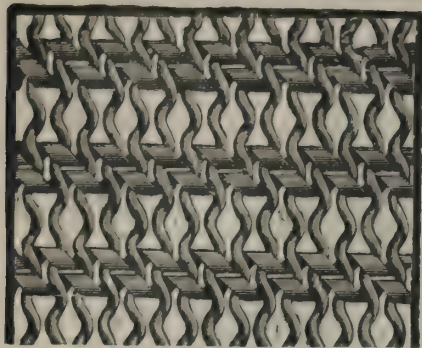
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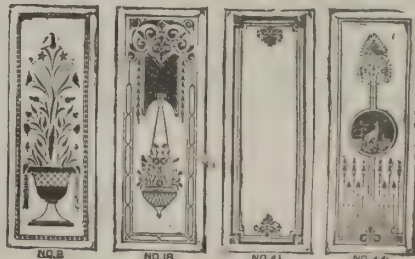
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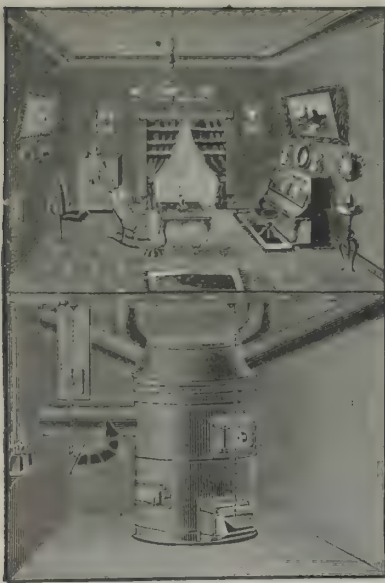
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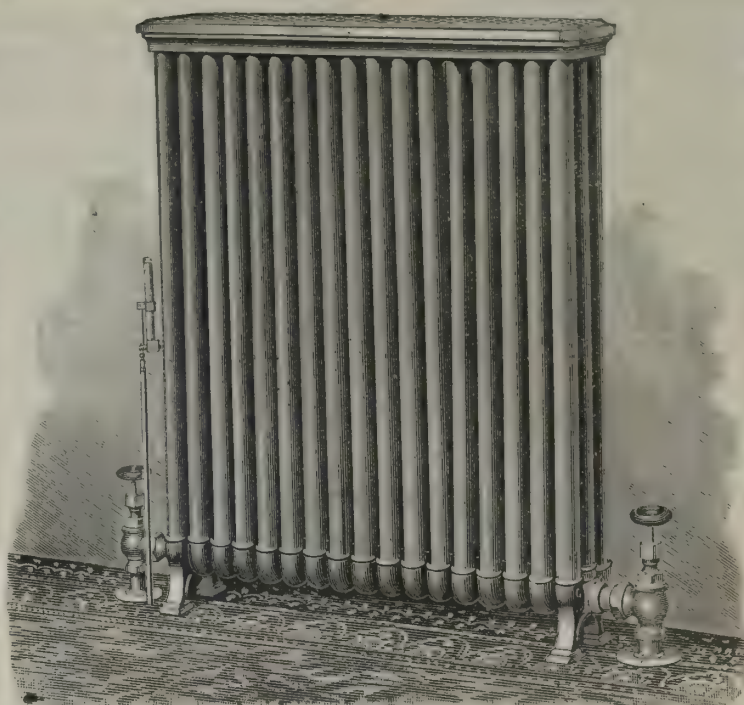
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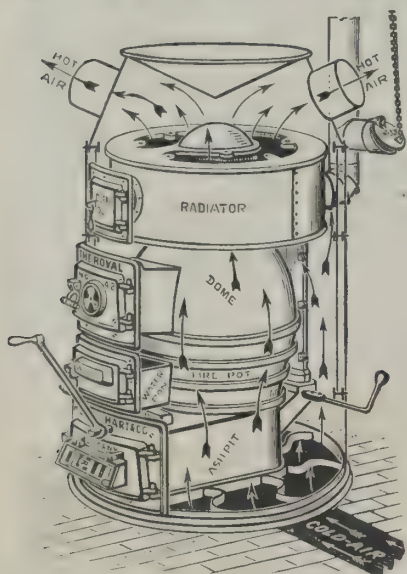
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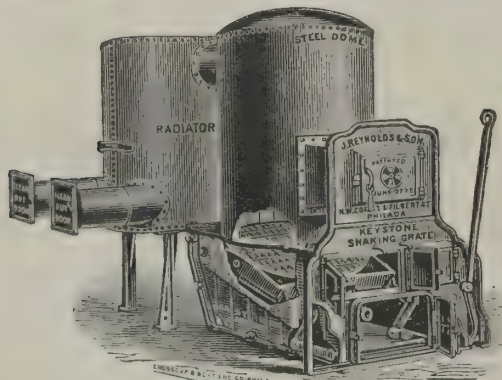
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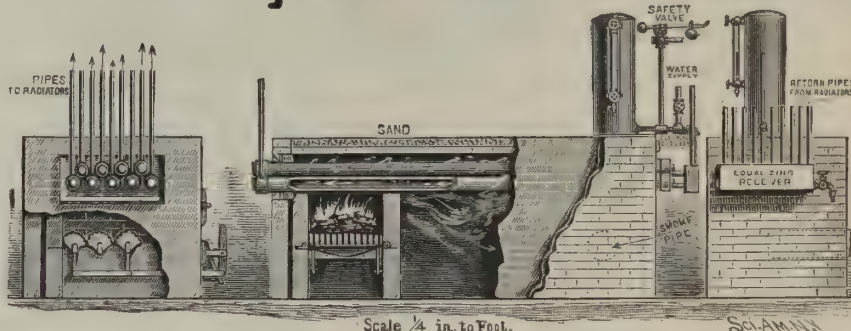
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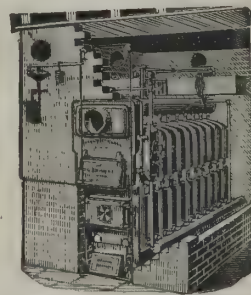
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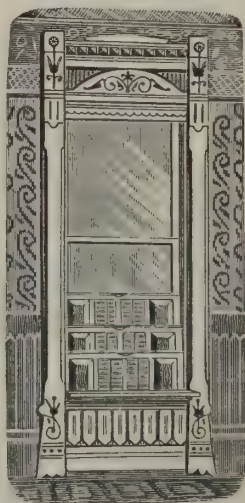


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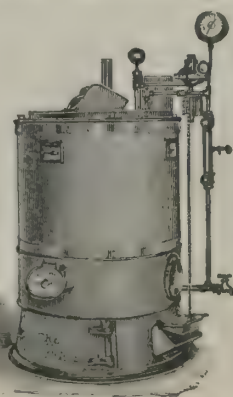
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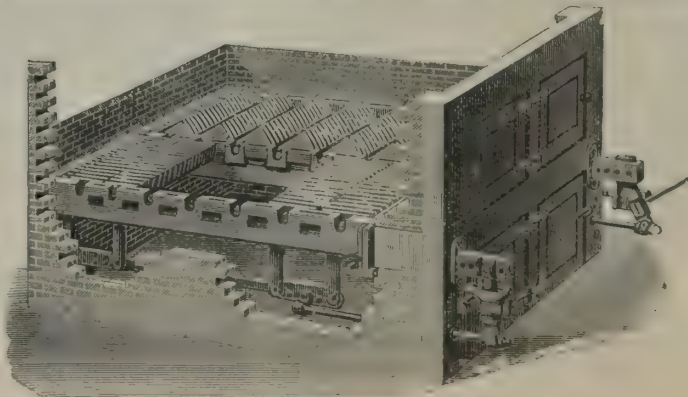
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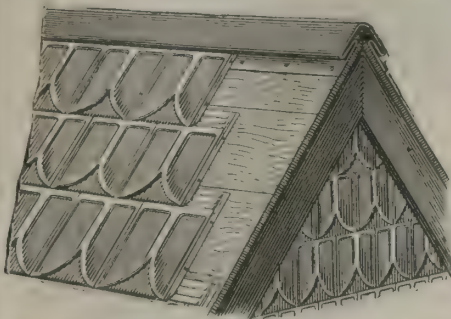
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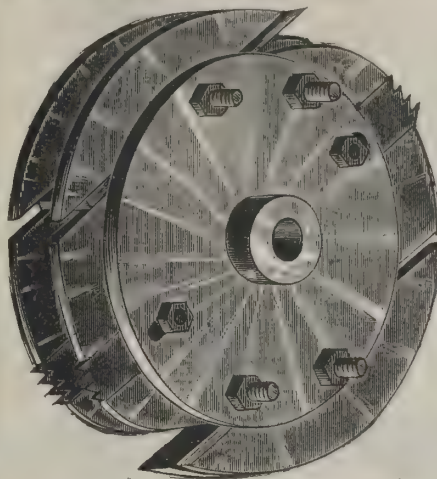
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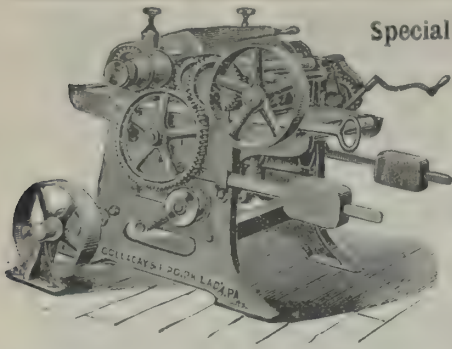
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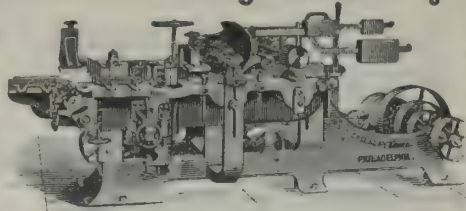
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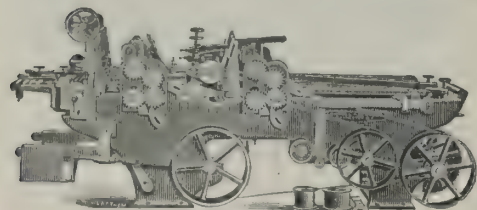


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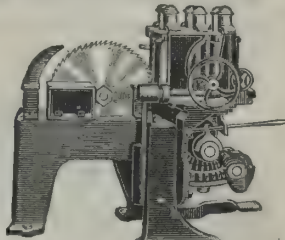


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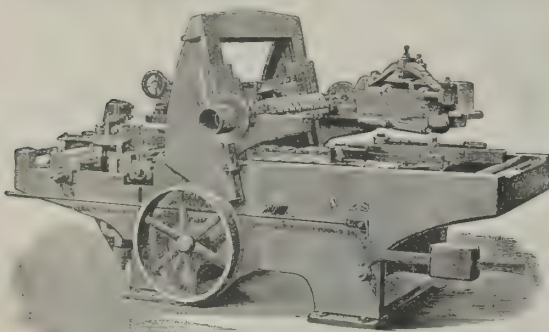


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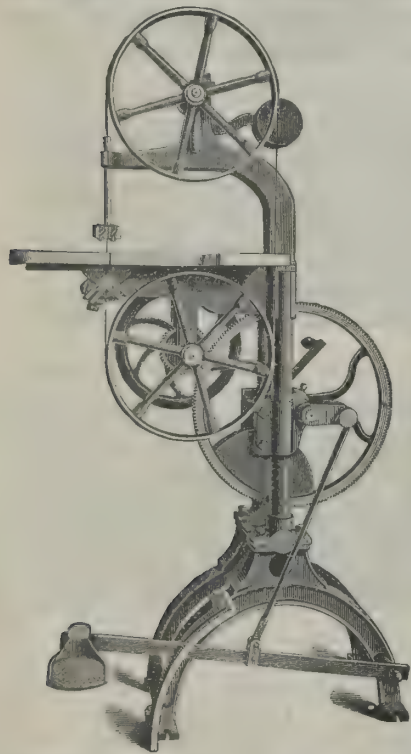


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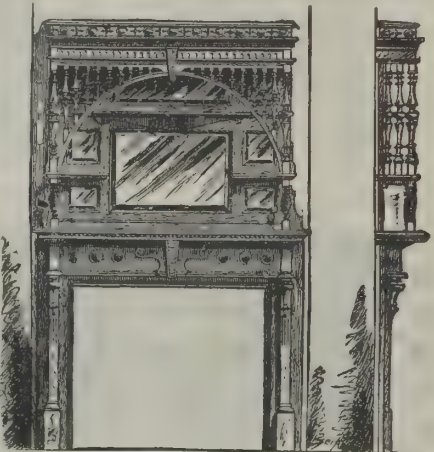
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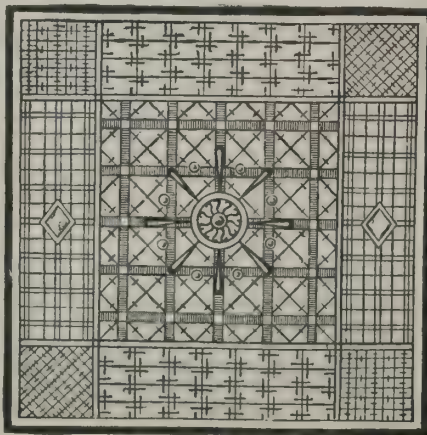
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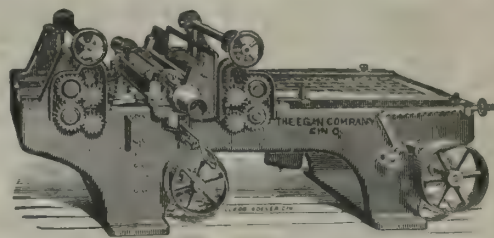
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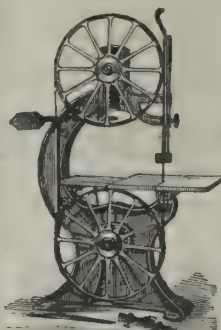
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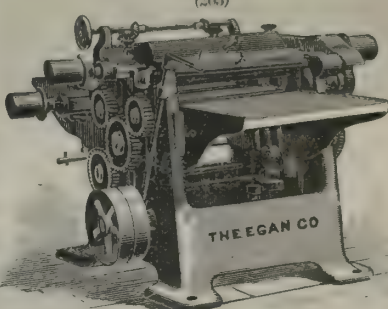
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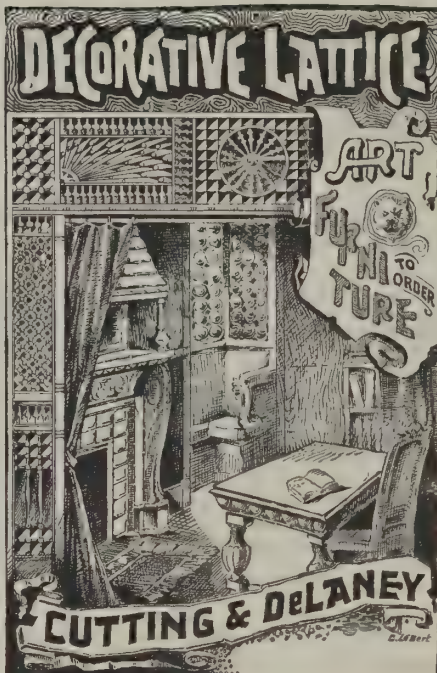


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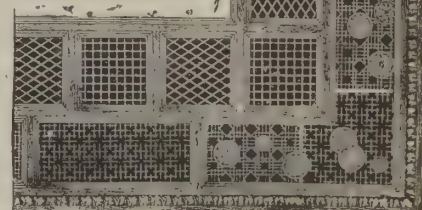
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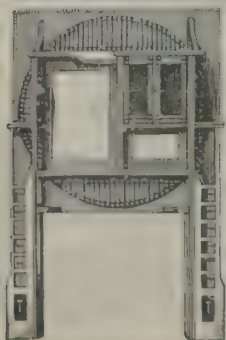
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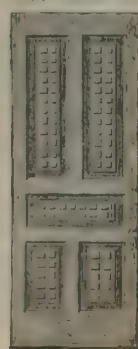
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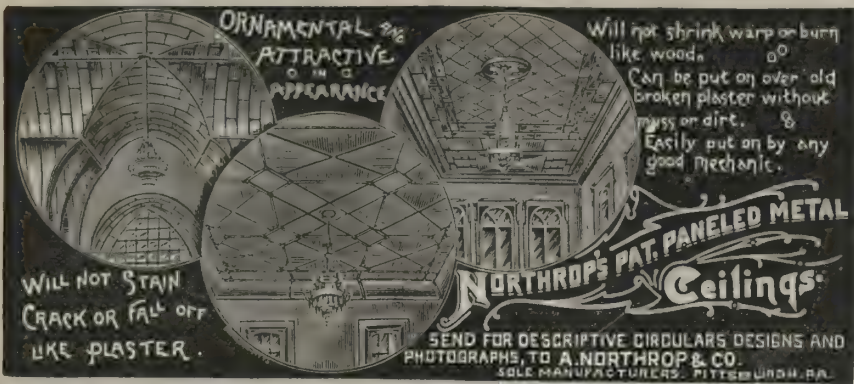
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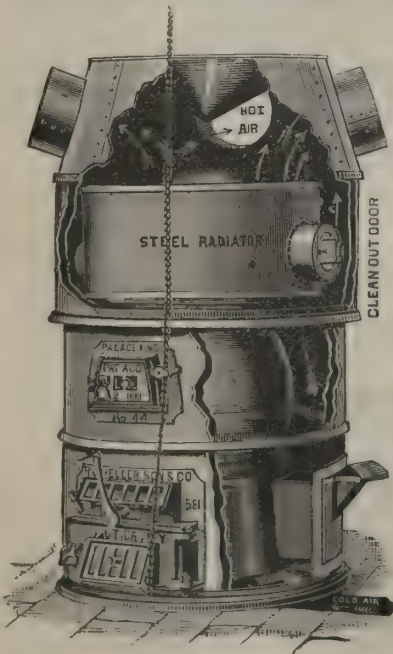
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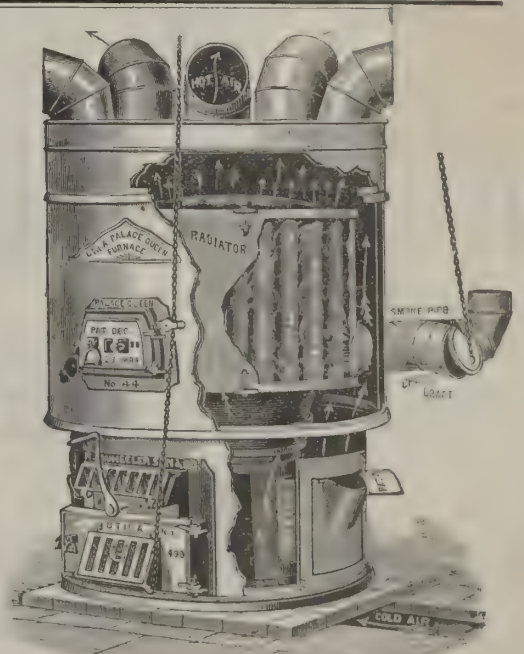
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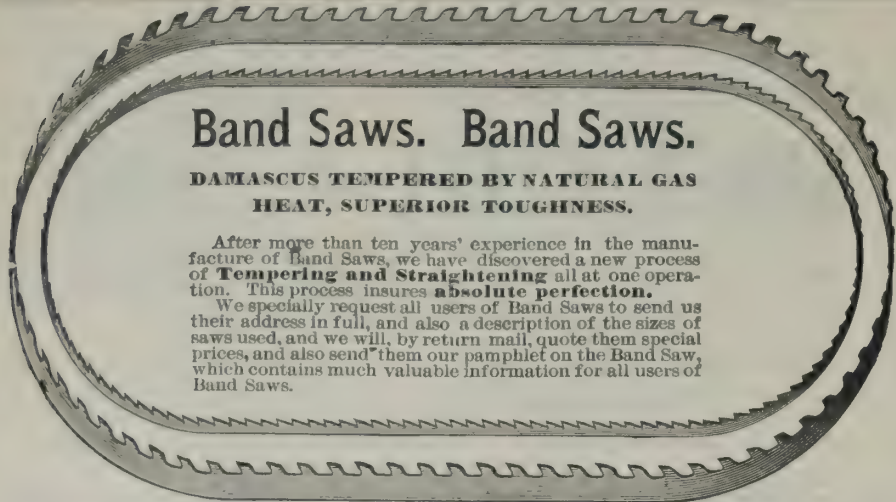
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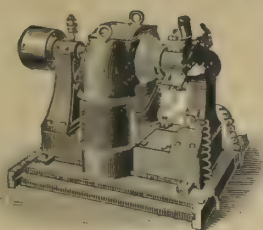
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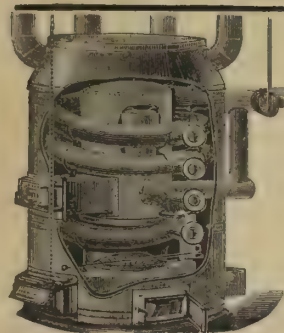


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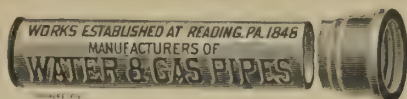
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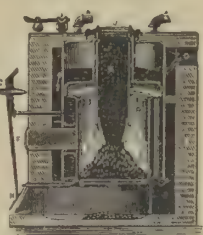


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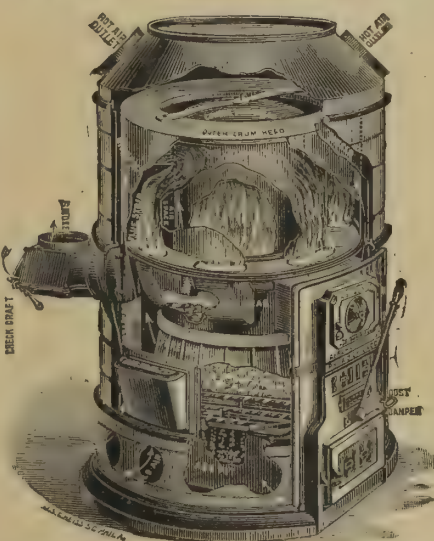
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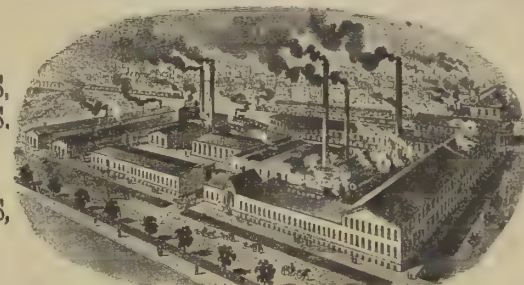


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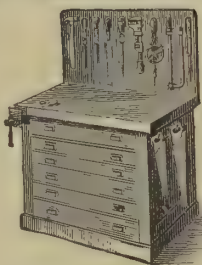
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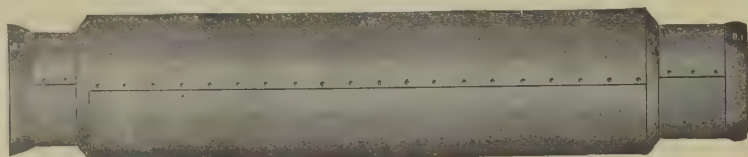
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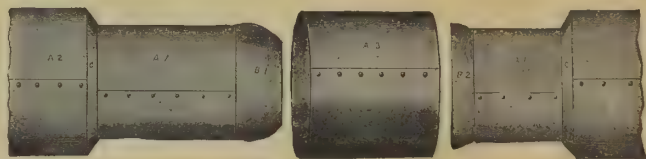
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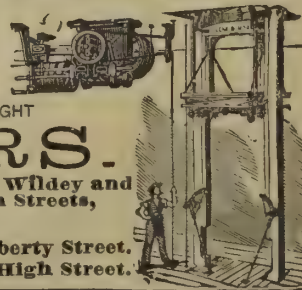
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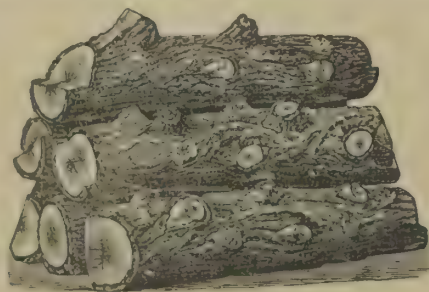
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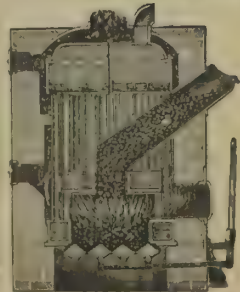
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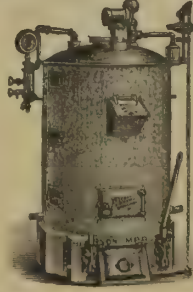


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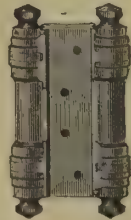
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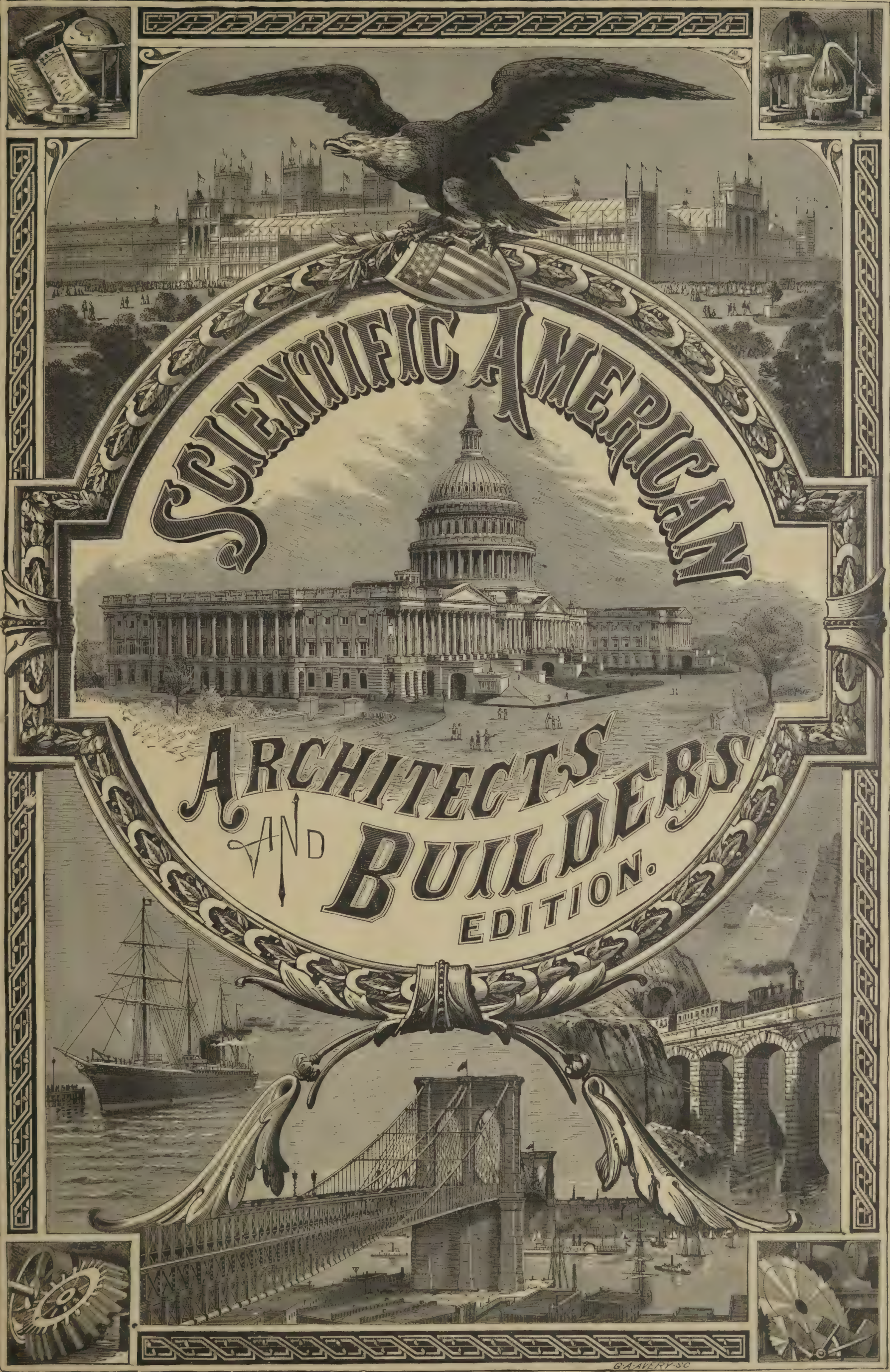
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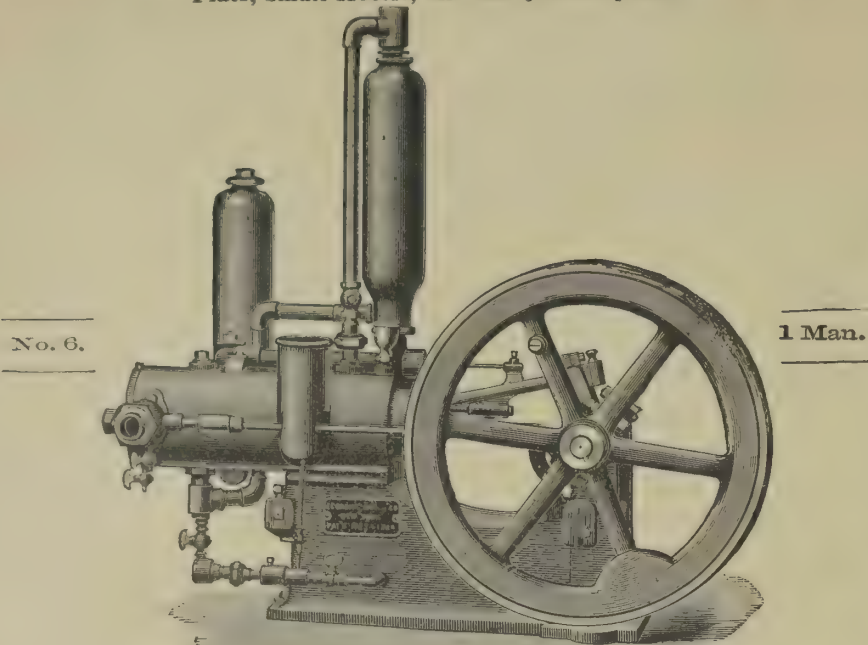
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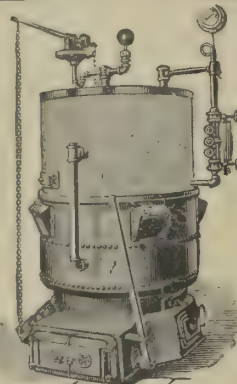
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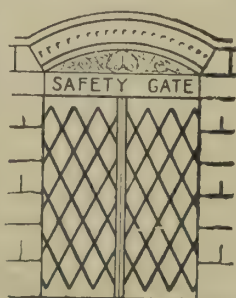
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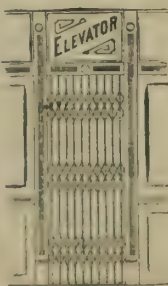
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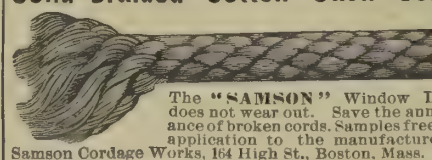
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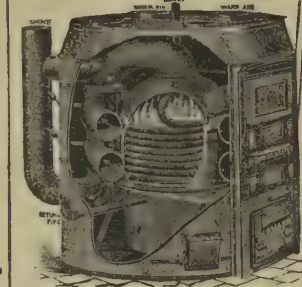
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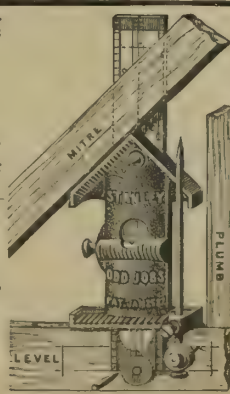
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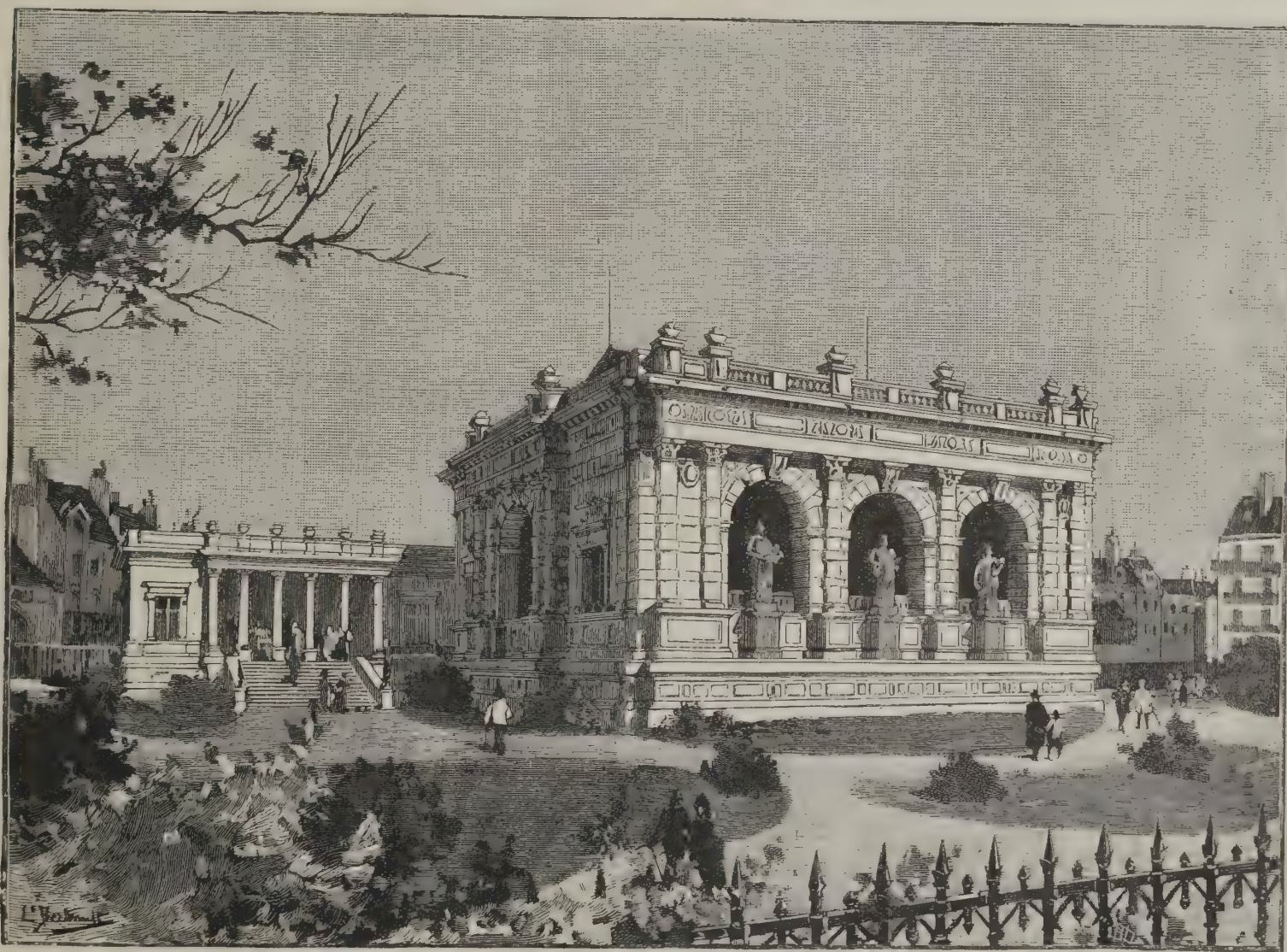
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[For description see page 20.]

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Of the February number of the ARCHITECTS AND BUILDERS EDITION OF SCIENTIFIC AMERICAN.

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A COUNTRY DWELLING.

One of our plates in colors for this month shows a perspective and plans for a comfortable house of moderate cost, designed by Munn & Co., architects.

The floor plans of this dwelling are well arranged. On the first floor, the hall, parlor, and dining room are connected by sliding doors. The hall is of good size, and on ascending three steps of the main stairs, is a landing, 6'x6'. Piazza and vestibule are noticeable by reason of their liberal area. The kitchen is provided with two good pantries and an inclosed porch. The entrance to kitchen from front hall is under main stairs, and almost concealed from view.

The overhang of the bay on second story gives a very roomy chamber, and there are three other rooms of good size, as well as a bath room. The hall space on this floor is also large, and ample closet accommodation is provided. There is a cellar under the whole house.

The front elevation is attractive.

The tower and second story bay are prominent features, while the contours and broken lines of the side elevations render them pleasing.

Size of structure: front 37', side 32', not including projection on the piazza or kitchen annex. Size of rooms see floor plans.

Height of stories: cellar 7', first story 9', second story 8' 6".

Materials: The vertical sides are covered with novelty boards and shingles. Roof shingled. Cellar wall brick.

Cost, including mantel, about \$3,500.

THE GALLIERA MUSEUM, PARIS.

Although popularity easily becomes attached to the plebian or obscure name that a life of devotion and charity illumines, it is not the same when such name shines of itself, through its ancients or through the ideas of pomp and grandeur that it evokes, and with an *eclat* that renders it suspicious to the masses. The latter, envious and distrustful, find it difficult to bestow admiration upon him who rises too high above them. As if charity were not always admirable! Has the Duchess de Galliera, who has just died, been able to render her name of great lady popular? Who would dare to assert it? The thousands of unfortunates whom she has saved or consoled will bless her name and venerate her memory; but the crowd, in the presence of the great deceased, will, we fear, think no more of the two hundred and twenty-five millions that she inherited from her family and husband than of the works of charity and assistance of which she was the founder.

What a nobly and generously spent life! And what a funeral is due from France to this foreigner, who sowed charity with lavish hand over her adopted country! The Orphan Asylum and the Fleury Retreat cost her more than fifteen millions, and the Clamart Hospital more than ten, and it is by hundreds of thousands of francs that her annual donations to the poor must be figured. As to the museum which she erected near the Trocadero, and which bears the name of its founder, that has already absorbed five millions. Her country was not forgotten, for all that, and she gave twenty-five millions merely for the enlargement of the port of Genoa. Had she lived a few years longer, nothing would have been left to her of her immense fortune.

The Duchess de Galliera, daughter of the Marquis de Brignole, ambassador from Sardinia to France, under Louis Philippe, married Mr. Ferrari, afterward Duke de Galliera, who was then one of the principal railroad contractors of Italy, and who had been concerned in every fresh enterprise of the beginning of this century. Since the death of her husband she had been living a very retired life, and her magnificent house in Varenne Street had scarcely been open except to a few intimate friends. She was seventy-three years of age at her death, and she had lived but for charity, having found her sole happiness in that.

A few months ago, there died a writer of talent, Mr. Yung, editor of the *Revue Bleue*. As his successor, mention was made for the moment of a young contributor to the *Revue*, a simple college tutor, Mr. Ferrari. Mr. Ferrari, Duke de Galliera, is the son and sole heir of the Duchess. This young man, imbued with very extreme socialistic tendencies, repudiated title and wealth. He has, however, returned to more moderate ideas, and it was under the watchful care of this grateful and dutiful son that the Duchess died.—*L'Illustration*.

The Galliera Museum, Paris.

The death of Mme. De Galliera, like that of Mme. Boucicault, is a real grief to Paris, of which she was an inexhaustible benefactress. We would like to pay the homage due to her memory by publishing her portrait, but, through modesty, she has always refused to allow the circulation of her photograph, and her wish has been respected since her death by her friends. In place of her portrait we give a reproduction of one of her donations, the Musee Galliera, which is to contain

the pictures and precious objects of the rich collection of the Rue de Varenne.

The best praise which can be given to this woman of means is a recapitulation of the list of her good works in Italy, her native country, and France. The poor of VII. arrondissement received from her 10,000 francs. The poor of Paris received 20,000 francs, without counting the amount given in Clamart, Meudon, etc. The St. Philippe Orphan Asylum and the Meudon House of Retreat cost fourteen millions, and there was a donation of eleven millions for the support of these institutions. The hospital at Clamart absorbed eleven millions; three houses for working girls, with free lodgings, two millions; and, finally, the museum of which we have already spoken, about five millions. These figures are eloquent, and yet they can only tell us what is already so well known in regard to the Duchess of Galliera. Her private charities must have been in the same proportion, but nothing will ever be known of them.

Born in the Genoese Patriarchate, Mme. Galliera was the descendant of the Doges of Genoa and the members of the Seigneurie de Sienne. Her father, the Marquis of Brignole-Sales, was prefect for Napoleon at Savone during the captivity of Pius VII., toward whom he showed the greatest deference. Later he entered the service of Piedmont, was ambassador from his country to Paris, and did not return to private life until the day when Victor Emmanuel took possession of the patrimony of St. Peter.

She married M. De Ferrari, afterward Duke de Galliera, who added his immense fortune—gained in his colossal enterprises, particularly in the French railroads—to the fortune of the Brignoles. The fortunes of the two together are estimated at 220,000,000 francs.

Mme. De Galliera died in her palace on the Rue de Varenne, a part of which was occupied by the Comte de Paris, and in which were given the fetes in honor of the Duke of Braganca on the occasion of his marriage to the Princess Amelie. It is well known that these fetes formed the pretext for the expulsion of the princes. It is said that this magnificent residence has been left by will to be used as the Austro-Hungarian Embassy. *Le Monde Illustré*.

ARCHITECTURAL LEAGUE, FOURTH ANNUAL EXHIBITION, FIFTH AVENUE GALLERIES, NEW YORK.

This exhibition was opened on Monday, December 24, 1888.

The chief feature of the evening was the presentation of the medals awarded to the winners of the previous year's competition. Mr. James A. McLeod, of Minneapolis, was awarded the gold medal, and Mr. W. B. Mundie the silver medal.

The subject chosen for this year's competition was "A tomb for an eminent architect."

Fifty-five designs were received in all; and a selection from these was made, and hung in the first gallery.

The gold medal is awarded to Mr. James Beite, of New York; and Mr. Oscar Enders of Chicago is awarded the silver medal. The design by Mr. Beite is an "Ionic temple" placed on the side of a hill. The perspective is well executed in water colors, the surroundings being wild and picturesque, but the geometric drawings are carelessly done; and in a competition of this kind, more attention ought to be paid by the jury to the geometric drawings than to a water color perspective, as the object of such a competition is doubtless to forward study, accuracy, and detail by the competitors.

The design by Mr. Oscar Enders is a very careful classic study, the detail is admirable and cleverly drawn. The perspective is in ink, and truthful; it has a bright and clear look with it, and the whole of the design throughout is pure and good. Some difficulty was encountered in deciding between these two designs. Three jurors voted in favor of each. It was decided by the casting vote of the seventh juror two days later, he having been absent on the former occasion. His decision was in favor of Mr. Beite.

The honorable mentions are as follows, viz.: design under motto of "John Revelry Black," by Mr. Julius Harder of New York. Design under motto "Hellas," by Mr. R. C. Spencer of Boston. Design under motto "Græco," by Mr. Wm. H. Orchard of Rochester, N. Y. Design under motto "Old Love," by Mr. A. R. Ross of Davenport, Iowa. These designs are all good and well worth studying.

The regular exhibit drawings were numbered, starting from the left hand side as you entered the large room. No. 3 was a sketch, St. Mark's Episcopal Church, Kansas City, Mo., James & James architects, drawn by I. King James. The design is powerful, but the coloring lacks light.

Nos. 4, 10, and 82 were designs by Mr. Wm. A. Bates, all of which were good ink drawings carefully rendered.

No. 11 is a house at Narragansett Pier, R. I., by Joseph H. Taft. The coloring of this is too vague. As a water color drawing the colors are clear and transparent, but for an architectural drawing the detail is not sufficiently brought out.

SKETCHES FROM THE ARCHITECTURAL LEAGUE EXHIBITION.



PROPOSED MEMORIAL CAMPANILE FOR PLAZA OF PROSPECT PARK,
BROOKLYN N. Y.—HENRY O. AVERY, ARCHITECT.



TOWERS OF HOTEL AT BIG STONE GAP, VA.
BRUNNER & TRYON, ARCHITECTS.

No. 13 is the competition drawing for the World building by R. H. Roberts. The drawing is by Henry New, and is without doubt one of the best from his pen.

No. 124 is a sitting room mantel at No. 8 West 53d Street, New York City, by Mr. Charles T. Mott. The detail is beautiful and carefully drawn.

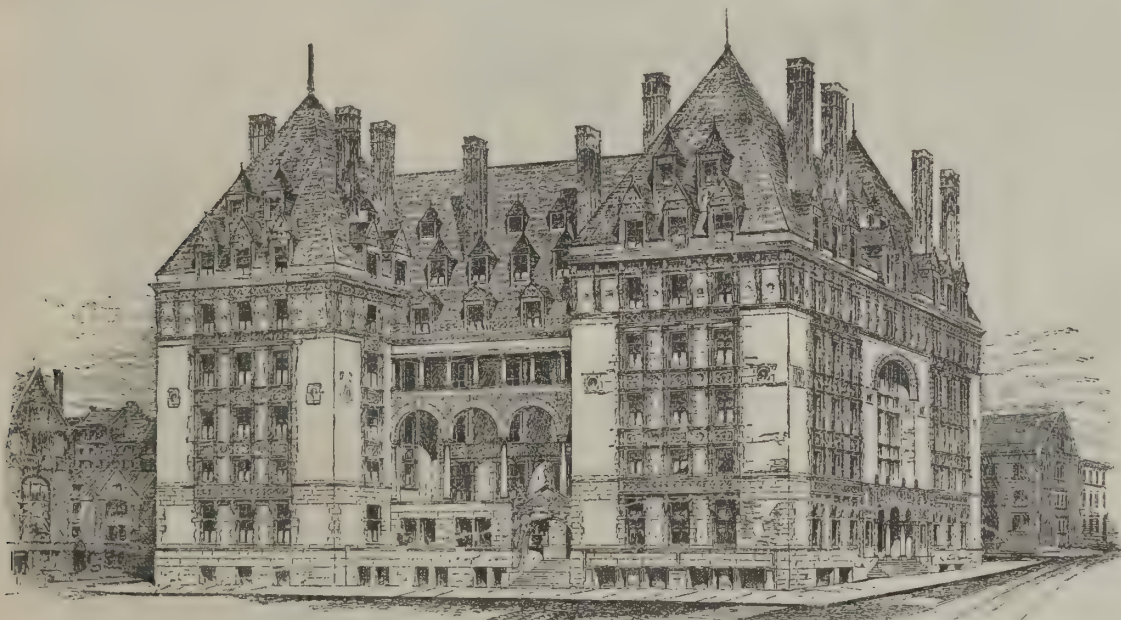
No. 141 is the Kneeland memorial chancel, Trinity Church, Lenox, Mass., Mr. Wm. C. Brocklesby, architect. The design is by Mr. D. A. Gregg, and in his best style.

No. 153 is the proposed municipal buildings, Washington, D. C., Willis Polk architect. The design is good, but the drawing is spoiled by the introduction of an absurd crowd of grotesque figures.

No. 156 is the new Physical Laboratory, Colby University, by Albert Winslow Cobb, architect. The drawing is by John Calvin Stevens, and in design and draughtsmanship is a nice piece of work. It is a pity that Mr. Stevens had not some of his more important works on exhibition.

Nos. 169 and 201 are three studies for church, Pittsfield, Mass., and church at Weston, Mass., by Peabody & Stearns. They are very interesting and cleanly drawn in water colors.

No. 203 is a study for Boatmen's Savings Bank, St. Louis, Mo., Burnham & Root, architects. The drawing is by Paul C. Lantrup. As a drawing it is far below the standard of this artist's work. The drawings for the municipal buildings were on view on the center screen; the design is in perfect keeping with the existing City Hall. Mr. Attwood is the architect, and deserves congratulation on his success. On the other side of the screen are an interesting collection of sketches by Mr. H. P. Kirby. They are after this artist's free style and are as studies clear, truthful, and bold, his manipulation of detail being exceedingly powerful. These are, without doubt, the best black and white drawings, and were full of new ideas, giving ample opportunity for a student to study the character of the work of this architect.



THE WASHINGTON HOTEL, KANSAS CITY, MO.—BRUCE PRICE, ARCHITECT, N. Y.

It seems a pity that a drawing worthy of so much merit should be so badly placed.

Nos. 27 and 32 are charming pen and ink sketches of a house at Swampscott, by Mr. Arthur Little.

No. 30 is a building at Minneapolis, Minn., by Babb, Cook & Willard, Henry S. Ihnen. The coloring is one of the best in the exhibition, being transparent and still bold.

No. 39 is a water color by the same artist of St. Ann's Chapel, New York, Mr. Ihnen being the architect. Also, the coloring is somewhat harsh, but on the whole is very effective.

There were various drawings by Mr. Clarence Luce and others after his style scattered over the walls of the large gallery, and, as before mentioned, the merit attached to them as water color sketches is considerable, but as architectural drawings they fail to bring the work into definite shape and form, too much being left to the imagination.

Nos. 53 and 59 are design of engine house in Detroit, Mich., and sketch of St. Joseph's Church, respectively, by Donaldson & Meier. The design is after these architects' peculiar and beautiful style. The drawings are sketchy and effective.

No. 61 is a sketch of a district school house, at Washington, Conn., by Rossiter & Wright. The design is broad and flowing, and the pen and ink drawing is a neat piece of draughtsmanship. There are several other drawings by this firm, and are in design and penmanship of the first water. We give a sketch of it.

No. 119 is a sheet of color studies, by George C. Palmer. They are tidbits, gable ends, etc., and are very interesting.

Nos. 130 and 139 are design for a Lenox house and design for a Newport residence, by J. A. Schweinfurth, of Boston. They are in water colors, and for sketches are the best in the exhibition.



DISTRICT SCHOOL HOUSE AT WASHINGTON CONN.—ROSSITER & WRIGHT ARCHITECTS.

There were many other drawings worthy of mention, but limited space will not allow for further remarks. In conclusion, the exhibition was fairly up to the standard of the third annual exhibition, and it has given pleasure to many of the members to become acquainted with the original work of our architects.

THE JAY GOULD TOMB.

The recent decease and burial of the lamented Mrs. Gould, a lady widely known in this community for her benevolent disposition, calls to mind the beautiful structure in which her remains now rest.

Probably no cemetery in this country can boast of a more classical specimen of mortuary architecture than is exhibited in the tomb of Mr. Jay Gould, in Woodlawn Cemetery, which is situated within the northern limits of this city. The design is said to be derived from the famous *Maison Carré*, at Nîmes, France, built some two thousand years ago, and which is the best preserved and most beautiful specimen of Grecian architecture in existence.

Our artist, in the selection of the view he has chosen for showing the structure to good advantage, has exhibited good taste, but a wood engraving, even though as artistic as this is, fails to picture the full beauty of

of restoration explained to me. He showed me scores of massive shafts and capitals all cracked and shattered. In many cases their separated pieces were only held together by strong bands of iron. He told me how these noble monoliths had been thus split and rendered useless. It had been brought about partly by the great fire of 1574 and partly by the oxidizing and consequent swelling of thick iron bars that penetrated them just beneath their capitals. In all 116 of such damaged shafts have been removed, and new ones put in their places. In the removing of each one of these the greatest care had to be taken lest any giving way should take place in the walls above. By careful propping this was happily avoided. One of the most masterly removals and replacements was that of the shaft which supports the "fig-tree" angle of the palace. Here it was found that even the oaken piles on which the shaft stood required renewal. The work was accomplished without a hitch. By the use of copper and gutta-percha the evil of rusting in the new bars had been dealt with. The decorations of the capitals have been reproduced with the utmost exactness. Only skillful sculptors were employed, and an art committee scrutinized every stroke of the chisel. I know that in one case, where a face had been knocked off a

being directly on the coast of the Madeira Islands. The ravages of the teredo worm and the water-soaked condition of the logs render them of no market value. The weight of the barnacles, which have been forming on them for months, has caused the monster logs to partially disappear beneath the water, and they are more of a danger than before. The extent of water covered by these logs may be gathered from the report of Capt. Hoffstadt, of the German bark Bremen, who states that he was five days among the logs, many of them striking the ship, tearing the copper and damaging the rudder. Samuel Dabney, United States consul at Fayal, Azores, reports that, on June 12, a spruce log, forty feet long, drifted ashore. It was roughly sharpened at both ends and was identified as part of the raft.

A RESIDENCE AT RUTHERFORD, N. J.

The exterior lines are somewhat square, giving large rooms. The elevations are broken enough to give a pleasing appearance.

Piazza across the front, with bay windows on either side, and balcony over front entrance, are pleasing features.



THE TOMB OF JAY GOULD, WOODLAWN CEMETERY, NEW YORK CITY.

this handsome marble structure, with its graceful Ionic columns, reared upon a grass covered knoll, where it commands a striking view of the surrounding country.

Restoration of the Doge's Palace.

A correspondent of the *Scotsman*, writing from Venice on November 6, says: The great work of restoring the exterior of the Doge's Palace at Venice, which has extended over more than a dozen years, was completed the other day, when the last bit of scaffolding was taken down. As every one knows, two rows of marble columns and Gothic arches, one row above the other, run round the two main facades of the Palace, that toward the Piazzetta and that toward the Riva Deglia Schiavoni, and upon these rest the lofty massive walls of the building. The whole fabric depends for its stability on the soundness of these ranges of shafts and arches. If they gave way, ruin must be the speedy result.

It was among these that decay had not only begun to work, but had made serious havoc, so much so that unless this work of restoration had been accomplished, this palace, unique among the buildings of the world, must have gone to pieces.

I had lately the good fortune to visit the works under the escort of one in charge, and of having the methods

capital and lost, the committee met time after time to consider, not its character, for that was known perfectly from others on the capital, but simply the exact way in which it had originally been set. All the antique columns, capitals, and stones have been arranged and catalogued, and will be carefully preserved in the palace itself, so that reference to any original piece of work can be made at any time. The Venetians are proud that not a single accident occurred these many years of labor, and they are to be congratulated on the completion of this great work, which restores to something of its original solidity this palace, which belongs, not to Venice, but to the world.

The Broken Timber Raft.

The *Boston Building News* says the scattered portions of the great Leary timber raft, abandoned off Nantucket Shoals in December last, are still drifting eastward, and at the present time cannot be far from the rocks of Gibraltar. The residents of the Azores and Madeira Islands already report their shores lined with trunks of huge trees, which are beyond doubt parts of the Leary raft. Capt. Lawrence of the bark Platena, from Huel, via Spain, reports passing on September 4, in latitude 35 degrees, longitude 18 degrees great fields of logs adrift. This is the greatest distance to eastward which they have been seen,

Foundation of stone. Exterior covered, first story with beveled clapboarding, second story with octagonal cut shingles, roof shingled.

The plans show large rooms, conveniently arranged, provided with all the improvements; the trim throughout is hardwood.

Open fireplaces, with neatly laid tiled hearths, and mantels of hardwood.

The hall has a bay window, and other windows glazed with stained glass. Staircase landing, with a window seat.

The parlor and study finished in cherry, dining room finished in oak, with china closet in corner, butler's pantry wainscoted with narrow beaded stuff and finished with drawers, shelves, and cupboards. The kitchen is wainscoted same as butler's pantry, with a large pantry fitted up in the usual way.

There are four large bedrooms on second floor, with closets. The front bedroom has a dressing room. Bathroom wainscoted, and fitted in the best manner.

In the attic are three rooms, with closets, etc., complete.

A cemented cellar under whole of house, well lighted, contains laundry and furnace rooms.

Our engraving was prepared direct from a photograph of the house taken specially for the *SCIENTIFIC AMERICAN*.



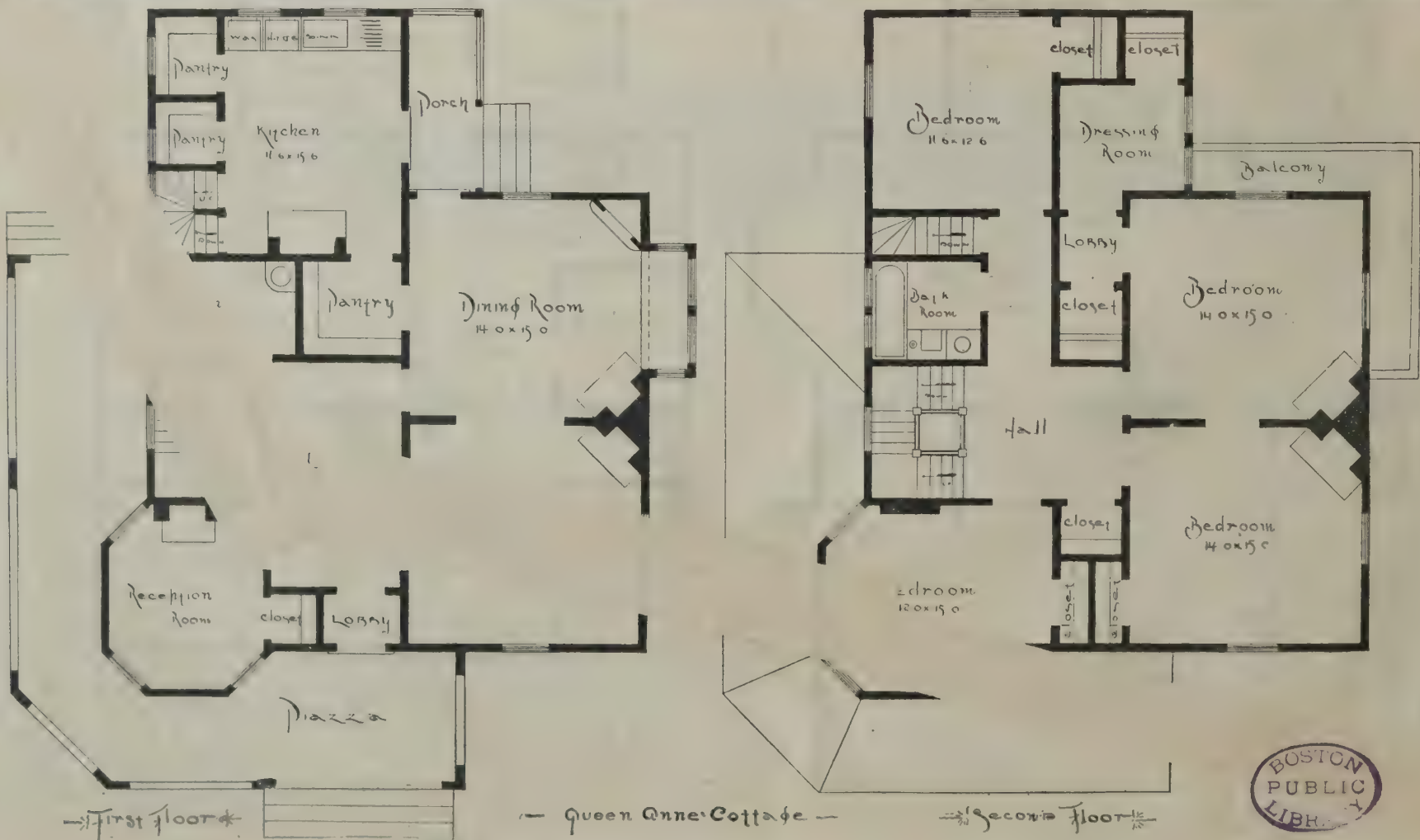
A RESIDENCE AT RUTHERFORD, N. J.



QUEEN ANNE COTTAGE AT FLATBUSH, LONG ISLAND.
Built at Flatbush, Long Island, for A. C. Case, Esq.
The treatment of this design is most satisfactory, and an attractive elevation, with a well arranged plan.
The construction of this design is of the usual kind, but substantial.
The materials are of good quality. The work is done in a good, workmanlike manner.
There is a cellar under whole house, cemented bottom, with coal, wood, and furnace room; also heater.

Foundation, stone.
The exterior throughout is covered with shingles.
Piazza runs across front, and has shingled posts, which run into arches, and has a good effect.
First floor has five rooms and hall. Second floor contains four bed rooms, dressing room, and bath room.
Staircase is constructed of whitewood, with a hat and coat closet under.
The trim throughout is of whitewood, and is finished in its natural wood.

The door and window casings are beaded and band moulded.
The den can be used as an office if desired.
The staircase has newels and balusters neatly turned.
The parlor and dining room are large, have open fireplaces, with tile hearths, and mantels.
The dining room has a bay window and a china cabinet.
The butler's pantry is fitted up with drawers and shelves, complete.



A QUEEN ANNE COTTAGE AT FLATBUSH, LONG ISLAND.



The kitchen is provided with a range and wash trays and sink.

Two pantries, fitted up complete with drawers and shelves. Back stairs to second floor.

The bed rooms have ample closet room, fitted up in the usual way. The bath room wainscoted 6 feet high.

There are three rooms and trunk room fitted up in attic.

The house is provided with gas and chandeliers.

The ceilings are corniced, and flower pieces are provided for the principal rooms.

The plumbing throughout is of the best.

The house is finished in a complete manner.

The cost of this house was \$8,000 complete.

A CARRIAGE HOUSE FOR \$1,000.

This stable has been lately built for Mr. A. C. Case at Flatbush, Long Island. Our engraving shows a perspective and floor plan, which are taken direct from a photograph of the building.

The main dimensions are 25x35. Stone foundation, sides shingled, roof shingled.

Carriage room is large and airy and has a carriage wash. Carriage room has accommodation for four carriages. Harness room 10x10, with a chimney; there is a glass case with sliding doors, provided with two drawers and harness hooks complete.

There are two stalls and box stall fitted up complete with iron hay racks, mangers; these stalls are all well lighted and ventilated. A cow stall is provided and fitted, and is separated entirely from the rest of the building.

There are two closets provided and fitted up complete for tools.

The loft has ample room provided for feed and hay; and there is also a man's room fitted up complete.

Water is provided.

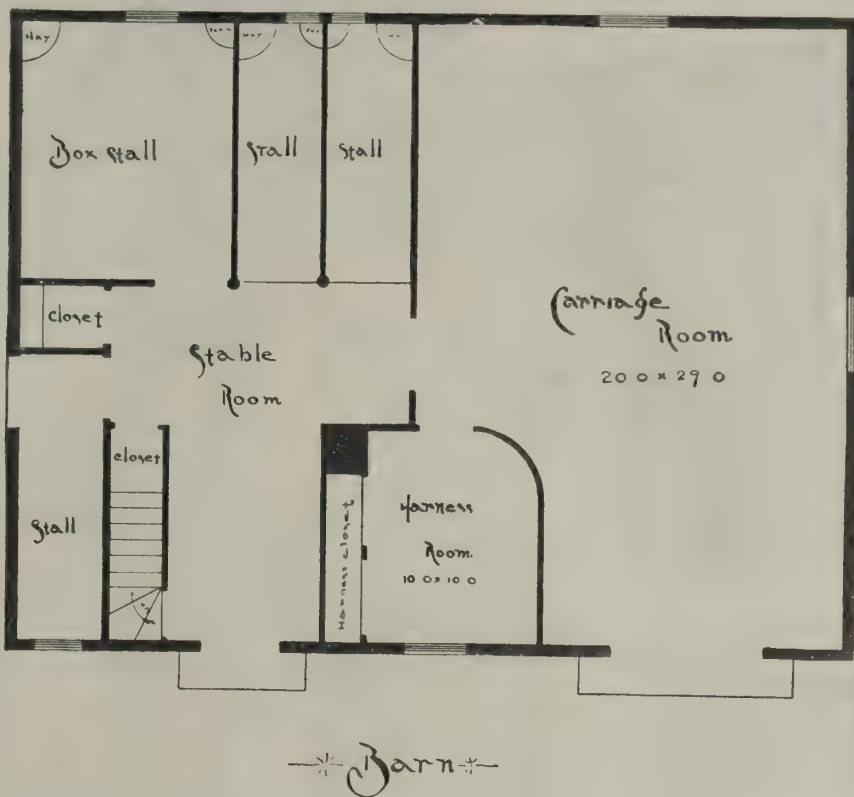
The cost of this barn was \$1,000 complete.

Our engraving was prepared from a photograph of the building.

Raising Columns of St. Isaac's Cathedral, St. Petersburg.

This operation, as described by Mr. R. L. Venables, in the *Architect*, was extremely interesting, from the size of the columns and the height at which they were placed, being the second tier or story of columns. Its

Petersburg and the country around for many a mile, the most interesting part of the prospect being the Gulf of Finland, down which I could see as far as Cronstadt. From the platform down to the next stage, a depth of about 80 ft., was fixed a strong timber frame, covered with planks, so as to form a very steep inclined plane. At the bottom of the slide, when I first looked down, the column to be raised was lying horizontally on rollers; it was girthed round with very thick ropes drawn very tight, and padded underneath. Other ropes, or, rather, cables, secured to these girths passed lengthways along the column, crossing each other over its lower end, and it was lashed to strong planks which lay under it, that the polish of the stone might not be injured in ascending the slide. Over the base on which the column was to stand was placed a high framework of strong timbers. The cables, twelve in number, attached to the column passed through blocks fixed to the frame, and, with the aid of one movable pulley to each, were drawn by twelve capstans, each manned by fourteen or sixteen men. There were two extra capstans for the purpose of guiding the lower end of the column when suspended in the air. Altogether, upward of two hundred men were employed in the operation. When all was ready, the capstans began to turn, and by degrees the column, instead of lying in a horizontal position, rested on the inclined plane, which was well greased, and began slowly to ascend, two men standing on its upper end, to be ready in case of the cables becoming entangled. The capstans were all numbered, and the superintendent at the top, by calling out sometimes to one gang, and sometimes to another, to move faster or slower, kept all the ropes drawing equally. The column at length reached the top of the inclined plane, and it was then raised until it was hanging in the high wooden frame exactly over the base on which it was to stand. A coin was dropped into a small hole in the center of the base, which was then covered with a sheet of lead, and, the tackling round the lower end of the pillar being cut



base must be 130 ft. or 140 ft. from the ground. Each column is a solid block of granite 42 ft. high, and weighing, it is said, 5,000 poods, or upward of 80 tons—larger than the columns of the Pantheon, and both larger and better wrought than any column found in the ruins of Zenobia's capital. The columns on the ground tier, each of which is also a single stone, are 56 ft. high, and weigh 11,000 poods each. He says:

"When I reached the platform to which the column was to be raised, I had below me a panorama of



A CARRIAGE HOUSE FOR \$1,000.

and cleared away, it was lowered gently into its place. The whole operation, which was now complete, occupied about two hours from the time the capstans began to work until the column rested upon its base."

A HOUSE FOR \$3,000.

On Howard Avenue, Bridgeport, Conn., for Mrs. Hurlburt.

The idea embodied in this design is somewhat unique—the arrangement of rooms so that two families can occupy the house, or one, as may be desired.

The building is constructed in a good, substantial manner.

One feature of the exterior is the arch on front porch.

The house is covered with clapboards of white pine and shingles are used in gables.

The parlor is large and spacious, also sitting room, dining room, and kitchen. Stairs leading to second floor, containing four large bedrooms, alcove, and bath room.

Open fireplaces in dining room and sitting room, with tile hearths and neat hardwood mantels.

China closet is fitted up in the usual way, with drawers and shelves.

Pantry is neatly fitted up with counter shelf and shelves over, with closets fitted up under counter shelf.

The bedrooms are all provided with ample closet



room, fitted up in the usual way, etc.

The trim throughout is of whitewood, with angle blocks at corners, and stained cherry and varnished.

The ceilings are corniced.

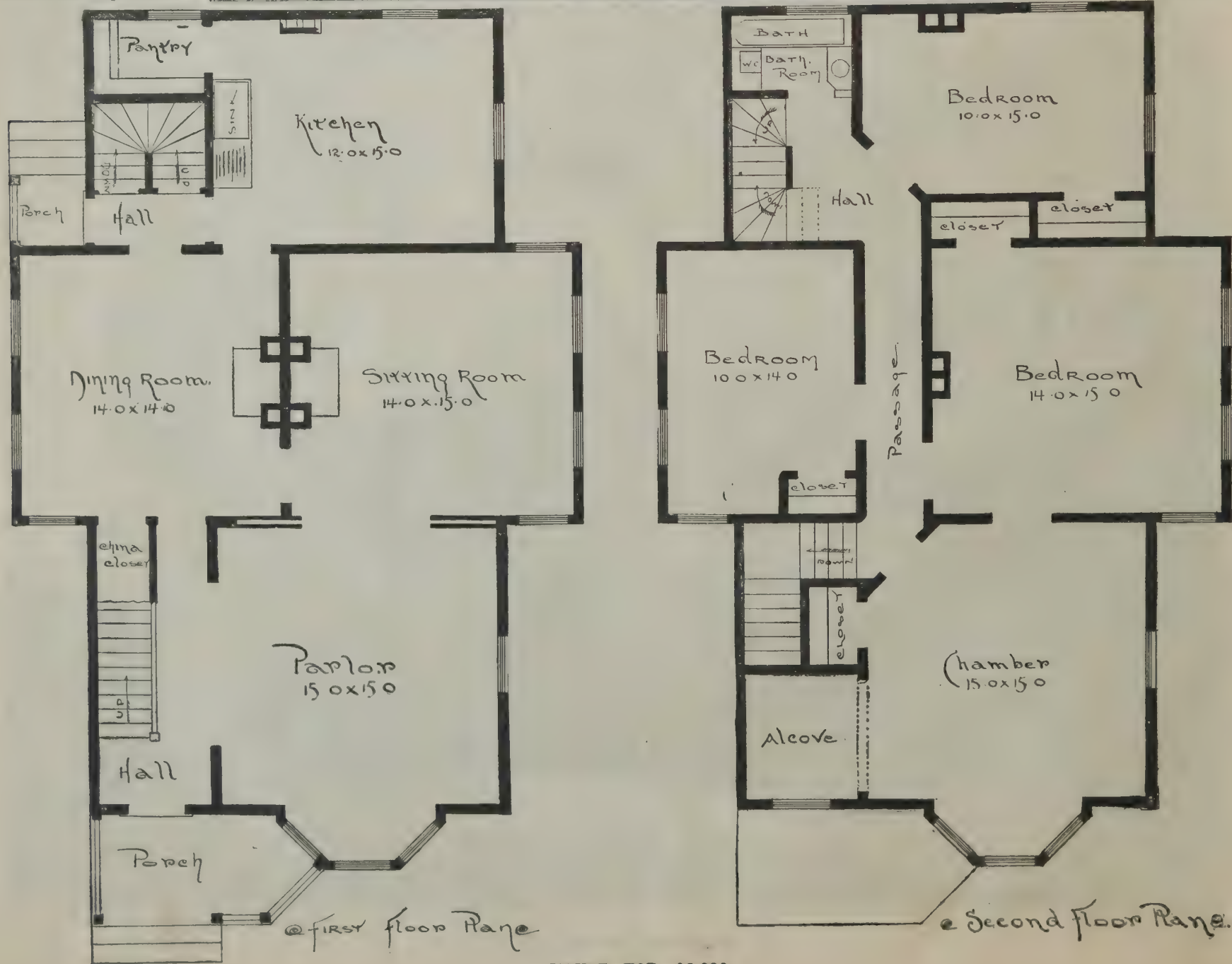
There is a cellar under whole of house, which is cemented, and contains coal and wood cellars and laundry.

There is ample room in attic, and two rooms can be finished off if desired.

Cost, about \$3,000.

Tarred Bricks.

The *Chicago Journal of Commerce* states that bricks impregnated with creosote or bitumen have been adopted for paving purposes in Nashville, and with very satisfactory results. The wear is very uniform, as the softer and more porous bricks absorb more bitumen, which has the effect of hardening them, at the same time making them absolutely impervious, and in this protecting them from the disintegrating effects of frost. It is stated that pavement of this type, exposed for three and a half years to the wear of a fairly heavy traffic, was at the end of that period found to be in excellent condition. The bricks used are of a special make, some factories having made a specialty of this particular branch of the manufacture. The process of bituminizing more than doubles the cost of the bricks.



A HOUSE FOR \$3,000.



A SUBURBAN CLUB HOUSE.



A COUNTRY DWELLING.





A SUBURBAN CLUB HOUSE.

Nothing more directly contributes to the delights of suburban and country life than the provision of convenient and agreeable places for intellectual and social enjoyments. In such matters the whole community takes an interest, and derives benefit. The promotion of social clubs has proved effective in securing these results, and nowadays in almost every town there is more or less disposition favorable to these organizations.

In carrying out a local club enterprise, the best success is likely to be attained, if generous proposals are presented in respect to the buildings. When a club begins in a mean little cramped-up house, it is liable to cripple and defeat itself at the outset. The aim and the talk from the first should be the erection of commodious quarters, where all the members can be rendered comfortable; where all can be provided with first class appliances for practicing games and amusements; where ladies may also be entertained, lectures and concerts given, discussions held, music and the drama cultivated, etc. Everybody becomes interested in the erection of a first class establishment of this kind. It is easier to raise for it a liberal building fund than a lesser sum for a small and insignificant concern.

In view of the growing demand for buildings adapted for the purposes mentioned, we have thought it would gratify our readers to present the elevations and plans for a good suburban club house. One of our colored plates this month shows the elevation in perspective; the floor plans and entrance are given on pages 28, 29, and 30. The design is by Munn & Co., architects, New York. The cost of the building will be from \$35,000 to \$45,000, depending on the locality and the style of finish.

Referring to the first floor plan, it will be seen that the building occupies a ground space of about 60 feet in width by 130 feet in length. In front is an ample piazza, with front and side stairs. From the piazza, doors open into the main entrance hall. We give a separate view of the appearance of this main hall, showing the elegant staircase to the second story. On the right of the main hall is the office, which overlooks the interior portions of all that part of the building.

In front is a spacious reading room and smoking room, separated by sliding doors. Hat and coat rooms are conveniently located on this floor. At the extreme end is the billiard room, with ample provision for six tables. Communicating with these rooms are several card rooms, gymnasium, etc. In addition to the main entrances already described, there are on this floor entrances to the private stairway, elevator, and bowling alleys. The magnificent bowling alleys, six in number, are situated in the basement, where are also located the steam heating apparatus, coal cellars, lavatories, ventilating appliances, cellars, etc. The bowling alleys are all of full size and of the best character.

Ascending the main stairway from the first floor, we come to a grand reception hall, from which entrance is had to a large parlor, directors' room, ladies' dressing and toilet room, hat and cloak room, and also the entrance to a large audience hall, 48 x 53 feet, having a stage, and a seating capacity for an audience of 450 persons.

In addition to the main stairway just mentioned, there is a private stairway, and also a special stairway from the street to the audience hall, so that the hall may be entirely shut off from the remainder of the building, and, when desired, access had to it only through the special entrance at the side of the building. On this floor there is also a large balcony, access to which is had from the reception hall.

On the third floor, ascending the main stairway, we have two large dining rooms, separated by sliding doors, which may be thrown into one if desired. On this floor is also an ample kitchen, butler's pantry,

toilet rooms, janitor's rooms, etc. The sizes of the various rooms are given on the plan, and it will be seen that all are of ample dimensions, and arranged in a very convenient and excellent manner. The ceilings throughout are of full height, those of the bowling alley being 12 feet, the first floor 14 feet, the second floor front 12 feet, top floor 11 feet. The ceiling of the audience hall is 25 feet in height, and lighted in the most approved manner.

It will be seen that the arrangements for windows and for ventilation are of the best character. The building throughout combines the most desirable qualities for club purposes, and cannot fail to give satisfaction wherever erected.

The distinctive feature of this club house is that the audience hall, parlors, and dining rooms can be let for lectures, concerts, and other purposes, without in the slightest degree interfering with the games or other privileges of the members.

It will be noticed that the three stairways provide the most ample facilities for the easy egress of the audience in case of fire, the two main stairways being each eight feet wide and the private stairway four feet.

The architects will be glad to give any further information that may be desired.

Malmaison.

Malmaison, the famous chateau of the ill fated Jose-

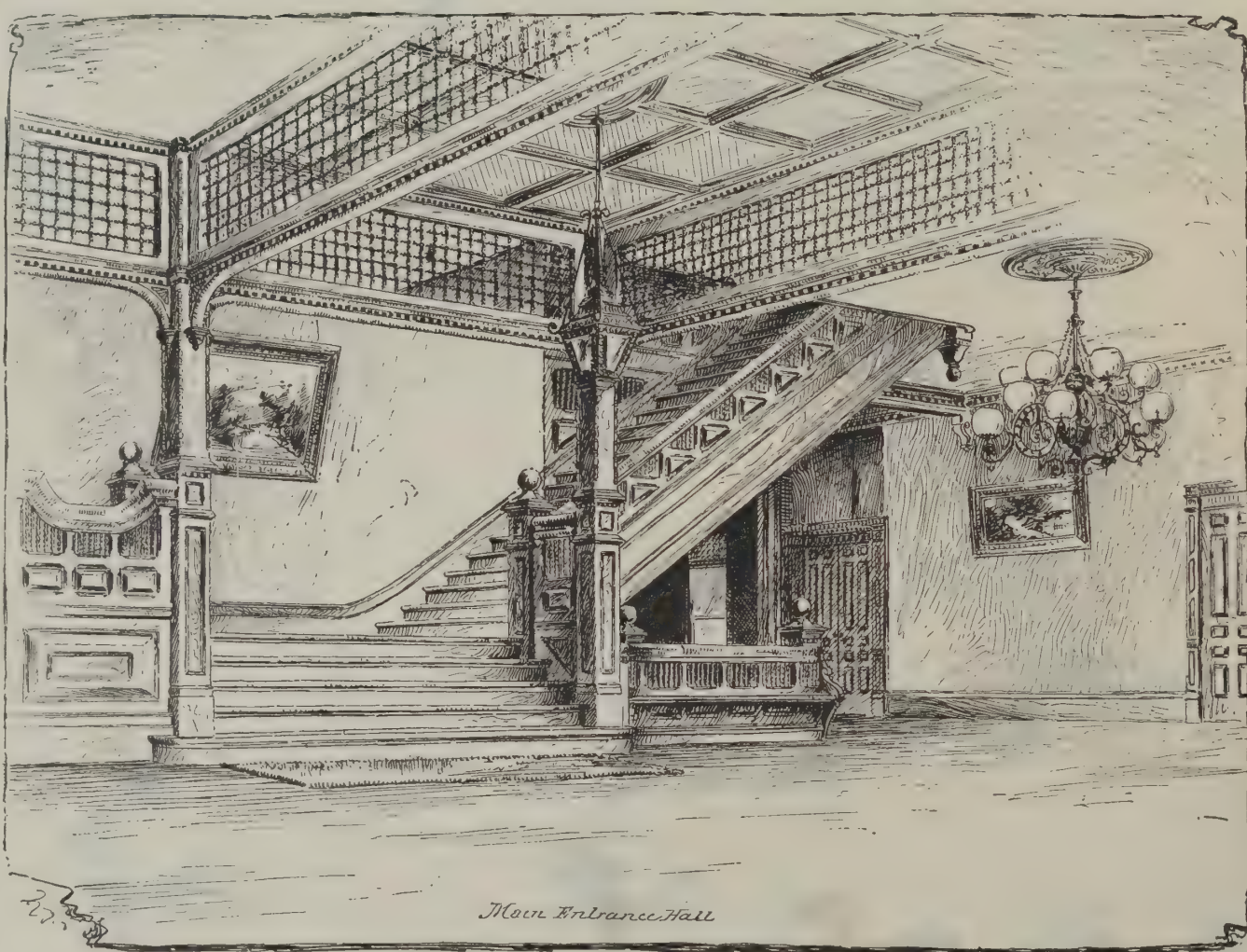
phine de Beauharnais, is simply going by piecemeal to the dogs, or rather to the rats, and it has been admirably suggested that the place should be converted into a museum containing historical relics of the First Empire. In the beginning of the present summer Malmaison was offered for sale at an upset price of £10,000; but no bidder could be found. The park is now let out in small lots to builders, and hideous villas are around the chateau. The two facades of the mansion, that of the court-yard and of the garden, are intact, but the interior is like a barn. The *salon* of Josephine still exists, with its mural decorations of birds and gilt flowers; and so do the dining hall, the council chamber—shaped like a tent—and the library; but the furniture is all gone, and the "pleasure house" of old is a melancholy wreck. It is to be hoped (the Paris correspondent of the *London Telegraph* remarks) that something will be done for the place in view of the approaching exhibition; for Malmaison was given to the state by Napoleon III., and was converted into a "Napoleonic Museum" during the World's Fair of 1867. The spot will be an interesting place of pilgrimage for the visitors to the exhibition, for Malmaison is to many more memorable than the Trianons at Versailles. Malmaison saw the triumph, the downfall, and the death of the "Creole girl" who became Empress of the French. It was there that Josephine presided over the Consular Court, and it was thither that she repaired on December 15, 1809, when the divorce was promulgated at the Tuileries which gave her place to the Austrian Archduchess. There, too, Josephine died in May, 1814, while Napoleon was at Elba; and when the conqueror himself was defeated at Waterloo, it was to Malmaison

Repairing a Well.

To the Editor of the Scientific American:

In the SUPPLEMENT of Oct. 20, 1888, under the title, "The Contaminating Well," are statements made that impress me with much force. The well of the writer was dug about twenty-six years ago. Though often cleaned, yet it seemed always foul. Tree roots grew through the wall between cleaning, and hung down in the well ten or fifteen feet like a goat horse's tail. The water seemed fairly alive with insect life. I muzzled the pump spout to strain out the villainous army of insects that infested the water. I saw that this straining process was a source of filth. Driven to desperation, I cured my patient thus: Took out the lining of the well, sank it five feet deeper, walled first five feet with brick, making internal space three feet diameter, cut stone cap to fit this wall, with manhole

twenty four inches diameter cut in center, with recess one and one-half inch wide and one-half inch deep run round manhole to receive spigot end of twenty-four inch sewer pipe. In this I set two four inch sewer pipes, spigot end down, with Portland cemented joint. Around this sewer pipe tamped clay to its top, like setting a post. In the flange of this pipe I put the spigot end of a second pipe, cemented and tamped with clay to top, and so on, until top of well was reached. I made brick wall eight inches thick around last thirty inches of top of sewer pipe, laid in cement. The brick wall stands one-half inch higher than top of last piece of sewer pipe. I spread over this brick wall and the last



A SUBURBAN CLUB HOUSE—MUNN & CO. ARCHITECTS, NEW YORK.

sewer pipe a layer of the best Portland cement mortar. I placed over all a stone cap eight inches thick, four by four and one-half feet, with manhole twenty inches square cut in center. Cement is spread all round underneath this stone cap from brick wall out. I laid brick pavement all round the stone cap in cement. The well is provided with a non-freezing iron pump. Not a drop of water enters the well until it passes through twenty feet of yellow clay, hard pan, and blue clay, except a little that enters the aperture, one inch by two inches, through which the plunger works. No foreign matter appears, except now and then a particle of rust from the inside of the pump tube. I have the best, purest well in Madison County. No tree roots, no insects, no need of muzzling pump-spout. Cost, two dollars per foot, exclusive of pump. London, Madison County, O. J. ARNETT.

IN connection with the publication of the BUILDING EDITION of the SCIENTIFIC AMERICAN, Messrs. Munn & Co. furnish plans and specifications for buildings of every kind, including Stores, Dwellings, Carriage Houses, Barns, etc. In this work they are assisted by able and experienced architects. Full plans, details, and specifications for the various buildings illustrated in this paper can be supplied.

Those who contemplate building, or who wish to alter, improve, extend, or add to existing buildings, whether wings, porches, bay windows, or attic rooms, are invited to communicate with the undersigned. Our work extends to all parts of the country. Estimates, plans, and drawings promptly prepared. Terms moderate. Munn & Co., 361 Broadway, New York.

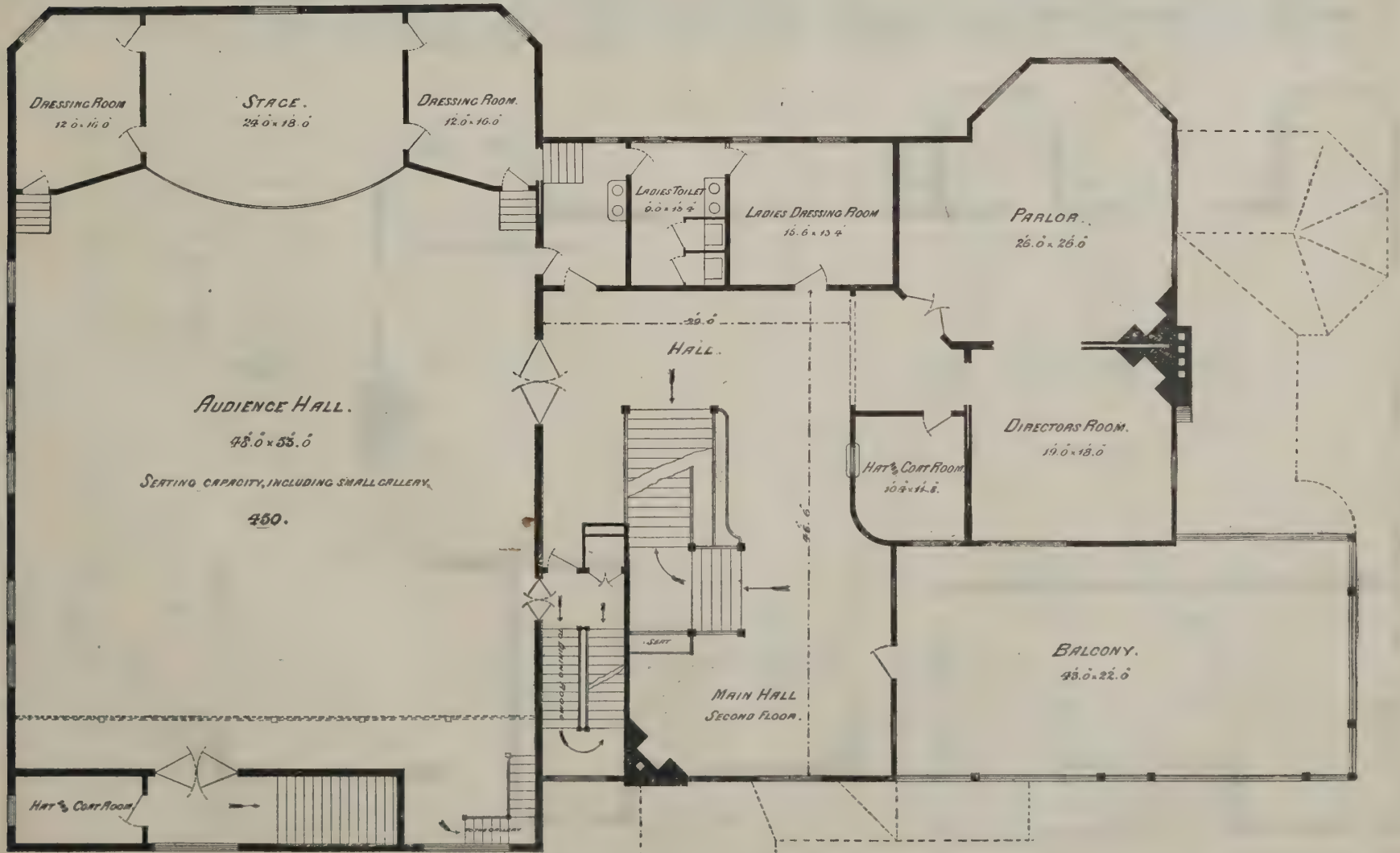
Pompeian Houses.
The walls of the dwellings are, as a rule, badly built, with ill-burnt bricks and rubble, and owe much of their stability to the plaster with which they are incased, and which is of good quality. Some of the surfaces, indeed, are so hard and fine that they bear a polish like scagliola or our hardest cements. In such cases great care has been taken with the last or finish-

ing coat, formed of sand, lime, and pounded marble. This was well rubbed down, and Vitruvius says the colors were laid on while it was wet, so that they became a part of the structure, like the more modern fresco, which was incorporated with the plaster, instead of being a mere surface application like ordinary painting. The Roman floors were often very beautiful, as you may see from the specimens preserved in

the museums of Europe, and particularly in the Louvre at Paris. They were made of cement, in which fragments of marble were set constituting mosaics. These existed in Pompeii in great variety, and some of the panels were very finely designed and executed. We have lately witnessed among ourselves a revival of this mode of constructing floors, the chief credit of which belongs, I believe, to the authorities at South



FIRST FLOOR PLAN



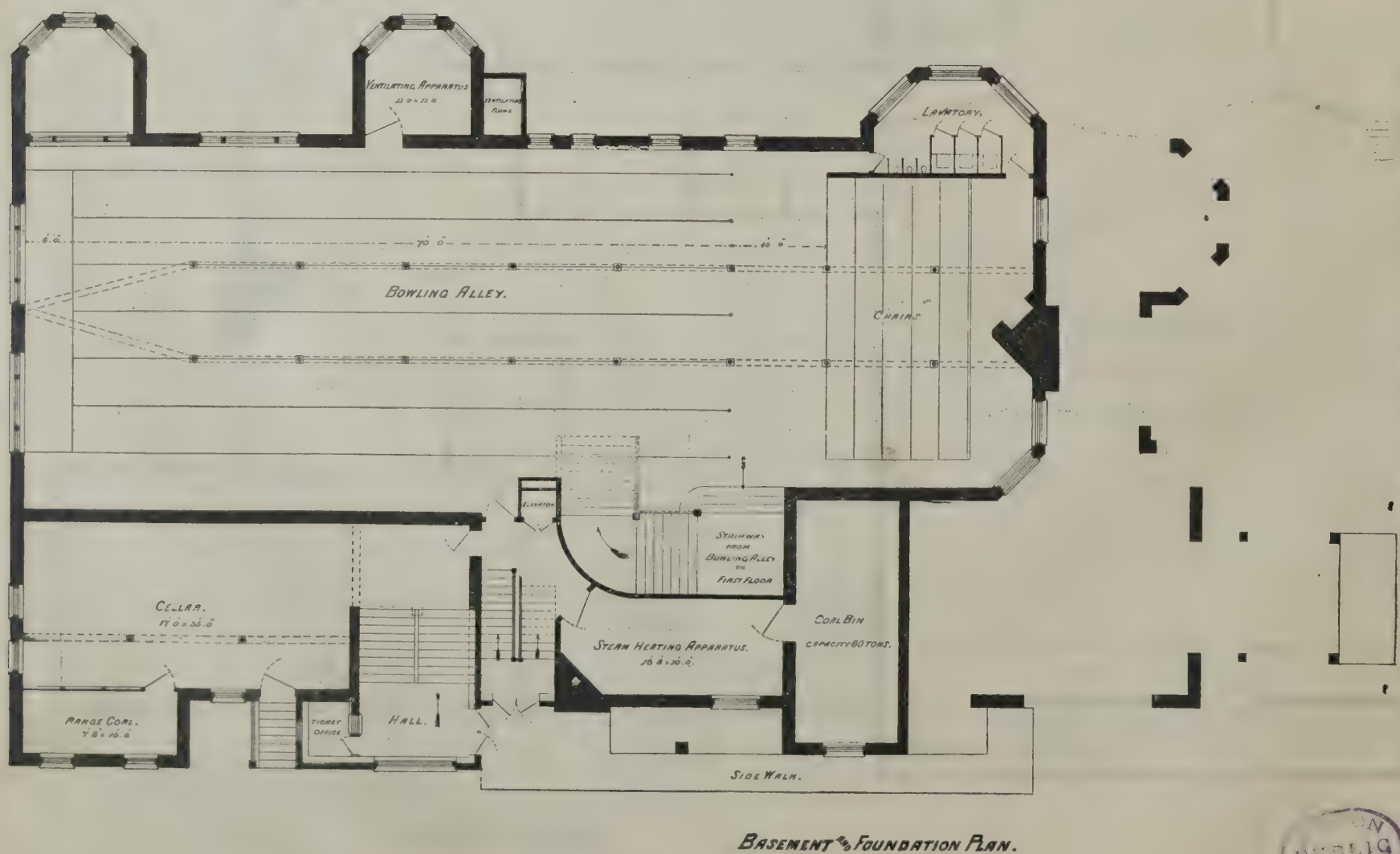
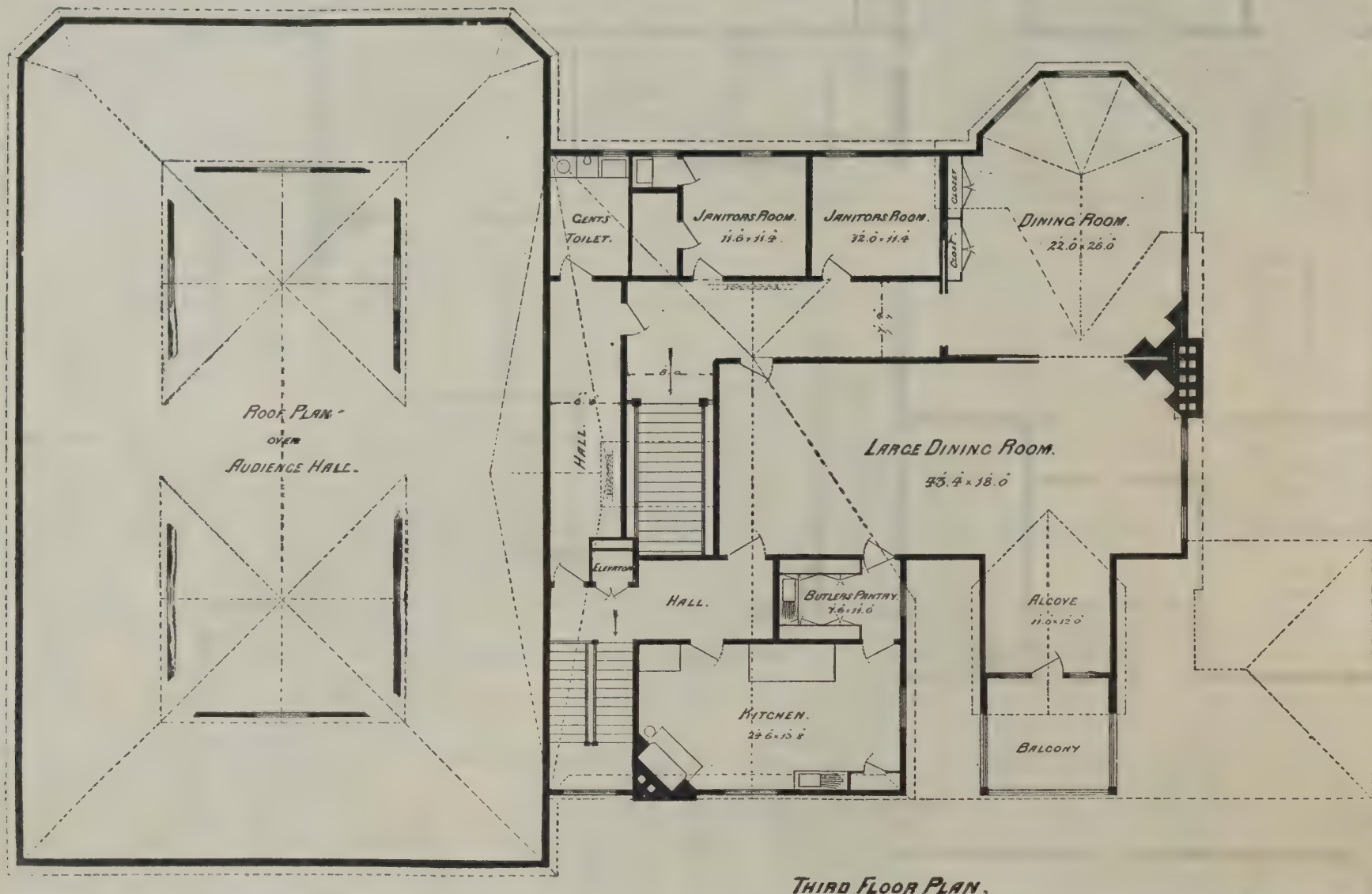
SECOND FLOOR PLAN.

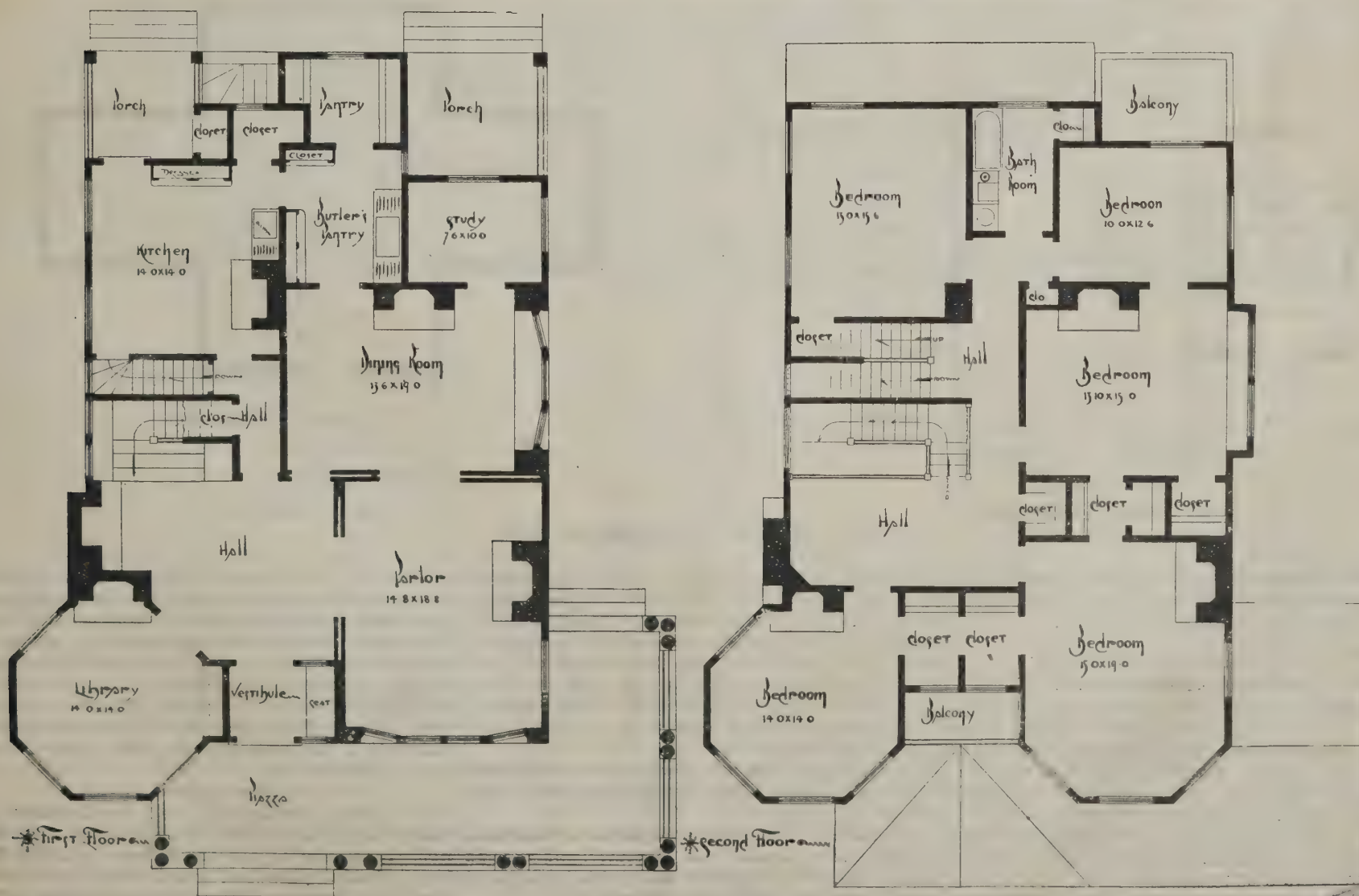


Kensington. The doors of the Pompeian houses were of wood. They were consequently destroyed, but their form and character can be distinctly traced. They had no hinges, but revolved on pivots, and must have made much noise when they were opened or shut. The creaking of a door was not objected to, however, as it was considered a proper mode of announcing the approach of a visitor, and thus served the same purpose as the modern bell. Iron chains and bolts were used at night for securing the doors. It is known that there was glass in Pompeii, not only for domestic utensils, but also for use in windows. It was, however, rarely used, in consequence, probably, of

its great cost. Some of the rooms in the public baths had glazed windows, and the glass was found in fragments when the building was first excavated. It is of good quality, and ground on one side to prevent persons outside from looking into the baths. In the museum at Naples there are great quantities of glass bottles and other vessels of the same material, all of which were found at Pompeii, and we may feel confident that so clever a people as the Romans were could not have employed glass for such purposes without perceiving its advantages for windows, when they wished to admit light while excluding the external air. Indeed, during the later times of the Roman empire,

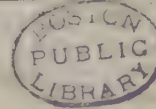
there is reason to believe that the walls of the great public baths were lined with glass as well as marble, and even decorated with mirrors. In connection with this subject, it may be here stated that in addition to glass vessels, almost every conceivable household utensil has been found at Pompeii, and among them portable fireplaces, braziers, and contrivances for heating water. In the houses generally there are no fireplaces or other permanent arrangements for warming, and it is difficult for us to understand how the people can have lived in health or comfort in these slight dwellings, with their courts uncovered and exposed to the vicissitudes of the climate.—E. M. Barry.





A RESIDENCE AT ORANGE, N. J.

[For description see page 32.]



A BOAT HOUSE OF MODERATE COST.

We give a design for a boat house, by Munn & Co., architects, New York.

Size of structure, front, 32'; side, 21'.

Interior arrangements, see floor plans. First story 12' high in the clear.

Materials.—Supported on piles driven in the ground. First story to top of windows clapboarded. From top of windows to plate, vertical boards. Roof and gables shingled.

Special Features.—The arrangement is very complete, the boat house being in the center, with the dressing rooms on either side. A continuous balcony runs

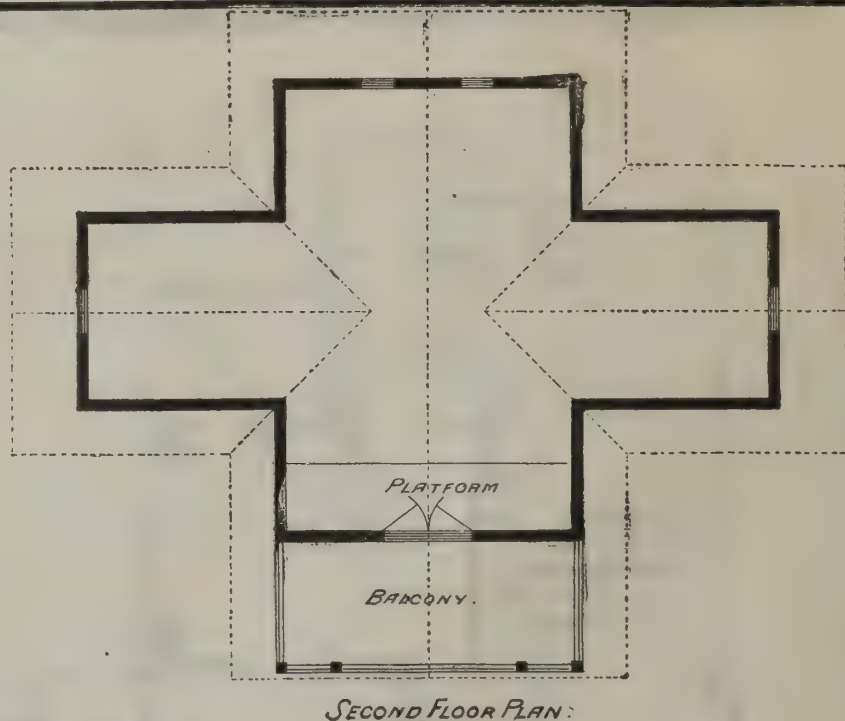
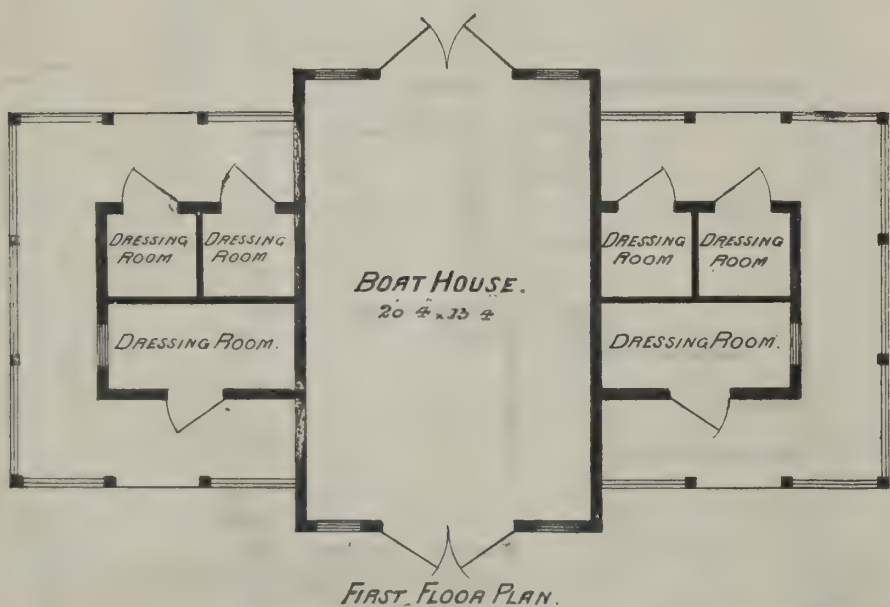
The front entrance has divided doors, also vestibule and seat, a tiled floor, and ornamental ceiling of oak, and windows glazed with stained glass. The reception hall is finished in old antique oak, the ceilings with beams, with heavy moulded panels between. There is a neat staircase. Newels and balusters are carved and turned of oak. There is a window with stained glass on the landing. The mantel is of Trenton pressed brick, terra cotta, and old oak; and the hearth and open fireplace are also of brick, laid in neatly.

All the rooms have open fireplaces, with tiled hearths and mantels of hardwood. The floors are of oak, laid in narrow widths, and the principal rooms are separat-

the house taken especially for the SCIENTIFIC AMERICAN.

Finish for Pine.

A yellow pine dealer from Alabama says that it will not do to apply oil to that wood in the finishing process. A shellac filling, and a subsequent application of shellac varnish, is the proper treatment according to this authority. He says that oil causes the wood to turn a dark and disagreeable color, which is precisely opposite to the natural appearance of yellow pine, which is bright and cheerful. This Alabama man's opinion is not indorsed by some of the dealers and woodworkers



A BOAT HOUSE OF MODERATE COST.

around these rooms, affording convenient access to the same. There is ample room above for storage for the various appliances connected with boating.

Cost about \$1,000.

A RESIDENCE AT ORANGE, N. J.

Our engraving shows a well-planned house, built at Orange, N. J., frontage 49 ft. by 62 ft. in depth. Some of the pleasing features are the octagonal projection at corner, that runs up two stories and terminates in a tower; the piazza, and a bay window over same; also the gables laid in panels filled in with stucco.

There is a foundation of stone, with an underpinning of brownstone, high enough to form a footing for piazza posts and chimneys at side.

The first story is covered with beveled white pine clapboarding; the rest of the exterior with cut shingles; the roof octagonal cut slates and a cresting of terra cotta.

ed by sliding doors. The parlor is finished in mahogany, the library in cherry, and has a bookcase built in the nook at side of room; while the dining room is in antique oak, with a window seat and a stationary buffet built in. All the rest of the trim throughout is of white pine, finished in the natural wood, except the den. This is finished in oak, with a French window opening out upon porch. The kitchen is well lighted and is neatly wainscoted.

There are five bedrooms on second floor, amply provided with closets. The bathroom is neatly wainscoted.

In the attic are three bedrooms, besides a studio, also a billiard room, finished and decorated, and a trunk room. There is a laundry in cellar, with fireplace and wash trays; also a furnace room in cellar.

The house is provided with gas and also is lighted by electricity. Cost \$14,000.

Our engraving was made direct from a photograph of

of this city. Yellow pine is often finished in oil here, and thus treated is considered richer and handsomer than when finished with shellac varnish only. It is true that oil gives a darker appearance to the wood, but its richness and tone is thereby secured, and that staring, vulgar, cheap appearance that is sometimes alleged of yellow pine is obviated. It is all a matter of taste. You can finish your yellow pine in oil or shellac and have a handsome effect in either case.—North-western Lumberman.

FULL plans, specifications, and details ready for the builder, of any of the houses illustrated in this publication, may be had on moderate terms at this office. Special plans and specifications for the erection of buildings of all grades are also supplied by us. Munn & Co., architects, 361 Broadway, New York. Plans for the alteration and enlargement or improvement of buildings are also supplied.

A BLOCK OF \$1,800 HOUSES.

Block of dwellings for M. Z. Havens, Esq., Syracuse, N. Y. Asa L. Merriek, architect. This block of frame houses contains six rooms to each house, with cellar under entire structure. These dwellings are built in an economical manner, and are intended to cost \$1,800 each. The block presents a neat and attractive appearance, and is designed to accommodate small families who are unable to pay high rent.—*Architectural Era*.

Architecture as a Profession.

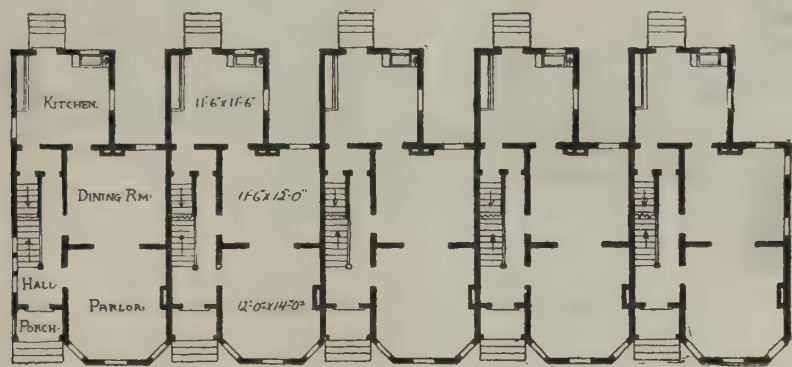
"Only eagles and reptiles can attain to very high places," was the epigram of the witty Frenchwoman who in her day was also confronted with the idea contained in the saying, "There is plenty of room at the top." This, says the *Building Budget*, is perhaps the most grimly oracular remark ever uttered and misunderstood by the young, in whose bright lexicon there is no such word as fail, and has undoubtedly caused more heartbreakings over misapplied lives than can be even approximately estimated. All professions are crowded with men who, dazzled by the prizes of wealth

his life, as well as several thousand dollars, he is naturally impelled to be diligent and to profit all he can by what he sees, hears, and reads—knowing that, if he does not, he will never reimburse himself for his outlay, and also that he cannot enter any other profession except at an equal expense of time and money, and that after a few years he will be considered too old to begin anything. This system has its advantages as well as disadvantages. One advantage is that it renders a parent very careful to find out as far as possible if the bent of the boy is well defined, otherwise, at the end of the time, it will be so much thrown away.

The disadvantage is that an idle pupil who does not care to improve his opportunities goes away at the end of his apprenticeship, and throws, to a certain extent, discredit upon the office where he was supposed to have studied. English architects have become so impressed with this fact that many of them openly advocate the entire abolition of article pupils, and prefer the encouragement of technical schools, where the old motto over the college door will be strictly enforced, "Learn or depart." America, in this respect, as in many others, has the advantage of profiting by the experience

scamping. In first-class work, after the first two coats have been put on, the paint, when dry, should be rubbed down with pumice stone before the finishing coats are put on. Inferior painting is so common that it has a demoralizing effect on painters of the day. The quality of the material, especially the white lead, has much to do with permanency. We find painting done on old work without any cleaning, stopping, or even pumicing. A slovenly and inartistic class of grainers are also met with, who repaint and regrain on work that ought to be well rubbed with pumice stone or sand paper before the first new coat is laid.

For painting three coats, the following materials are given for 100 superficial feet of new work: Paint, eight pounds; boiled linseed oil, three pints; spirits of turpentine, one pint; the work taking three men for one day. According to Saxton, forty-five yards of first coat, including stopping, will require five pounds of white lead, five pounds of putty, one quart of oil. The same quantity of each succeeding coat will require the same allowance of white lead and oil. The best materials will last for seven years, but the ordinary painting seldom lasts three. It is questionable in building



FIRST FLOOR PLAN.

BLOCK OF DWELLINGS
FOR
M. Z. HAVENS, ESQ.
SYRACUSE, N. Y.



A BLOCK OF \$1,800 DWELLINGS.

and fame, gained sometimes at a sacrifice of everything that makes life enjoyable, still struggle blindly on, though every one but themselves can see that they are forever doomed to disappointment. The only profession, if it may be so called, in which a man at once realizes his unfitness is that of the prize fighter. In this country there is one frequent cause of failure, viz., the short time which is requisite for a man to obtain a smattering of law, medicine, architecture, etc., so that a young man is everything by turns and nothing long, and after spending considerable good material, say for an architect, and just as he is really becoming of some use, thinks that law or medicine is his forte, or else thinks himself capable of setting up as a full-fledged architect, to the damage of the profession in general.

A youth wishing to become an architect in England has first to find a vacancy for an article pupil in the office of some first class architect, to whom his parents and guardians pay a premium, sometimes as high as five thousand dollars, and agree that the boy shall do all that may be considered as lawfully pertaining to the business of an architect, at the command of his employer, for the space of five years, frequently without any compensation whatever, excepting the use of the library, etc., found in all the important offices. During this time he has to support and clothe himself in the manner becoming a professional man, and accustom himself to doing whatever he may be told to do without question. Knowing that at the end of his term he will have invested five of the most valuable years of

of the old world, and, never having adopted the article clerk system, now that it has proved unsatisfactory after years of trial, can, untrammelled by tradition, bend her attention to fostering those very technical schools which she already possesses, and which are advocated as a remedy for the evils of the older system by those who were once its strongest supporters.

Paintwork.

It may be useful to know that a gallon of paint will cover from 450 to 630 superficial feet of wood. On a well-painted surface of iron the gallon will cover 720 feet. In estimating painting to old work, the first thing to do is to find out the nature of the surface, whether it is porous, rough or smooth, hard or soft. The surface of stucco, for example, will take a great deal more paint than one of wood, much depending on the circumstance whether it has been painted and what state the surface is in. We have known prices tendered for outside painting that have been seriously wrong, owing to the want of knowing the condition of the stucco work. A correct estimate of repainting woodwork cannot be made from the quantities only. A personal examination ought to be made in every case where there is much work to be done.

A great many painters trust to the quantity. The consequence is, nothing is allowed to remove old paint, or scouring, and the stopping of cracks. Then there is painting and painting. It can be done well and artistically, or indifferently, and few trades allow of greater

whether a saving is not possible by reducing the painted work as much as possible, and in using hard and ornamental woods for all ordinary interior framing exposed to wear, like doors, cupboard fronts, dados, stair balusters, spandrels, etc. In a few years the cost of repainting would more than repay the extra expense of materials. Take, for instance, an ordinary dwelling house let for £35 to £40 a year. In seven years the whole interior paintwork requires redoing, an expense that generally falls upon the landlord, who is generally tempted to have the work done cheaply, with the usual consequence that every new tenant wants the painting done.—*Building News*.

The National Association of Builders.

The next annual meeting takes place in Philadelphia, Pa., on the second Tuesday in February, 1889.

Some of the important matters which have so far been taken up and will be considered are:

"The Uniform Contract," "The Apprenticeship System," "The Lien Law," "Rules and Conditions for Estimating Work," "Permanent Arbitration with Employes," "Uniformity of Measurements," "Uniform Size of Brick," "Insurance against Accidents to the Public," "Establishment of a Department for Giving Sureties for Contractors on Submitted Estimates or upon Contracts," "The Establishment of Trade Schools," "Profit Sharing," etc., etc.

Wm. H. Sayward, of Boston, Mass. is the secretary.

HOW BEST TO LIGHT OUR COUNTRY HOMES AND RESORTS:

Under this title the Gilbert & Barker Manufacturing Co., makers of the well-known Springfield Gas Machine, have issued a little book illustrating and describing their peculiar lighting apparatus, and showing the

important position it has attained among the new and useful industries of these progressive times. The book is an elegant specimen of the typographic art. Besides the mechanical engravings, it contains views of dwellings which are lighted by the machines above mentioned. We give herewith a few examples of the

engravings, and we also note the following particulars concerning this method of illumination:

The gas made by these

machines is usually known as carbureted air gas, being common air impregnated with the carbonaceous vapors of gasolene. It burns with a rich, bright flame, fully equal to coal gas, and it is conducted through pipes and ornamental fixtures with the same convenience and safety.

This gas is really analogous to coal gas in its general features—the one being a carbureted air gas, the other a carbureted hydrogen gas.

Air gas possesses an illuminating power of from twenty to thirty candles, equal to the best coal gas, and much superior to that ordinarily supplied by city gas companies. It is a remarkably pure gas; contains no sulphurous compounds; with proper burners, combustion is perfect, without smoke or odor.



ASHLAND, THE HOME OF HENRY CLAY.



RESIDENCE OF MR. GEO. HEYWOOD, GARDNER, MASS.



RESIDENCE OF MR. E. H. BARNEY, SPRINGFIELD, MASS.



RESIDENCE OF MR. J. C. WILLETTTS, SKANEATELES, N. Y.



THE GAS COOKING STOVE AND BOILER.



A PARLOR GAS FIRE.

Gasolene, the fluid used in making the gas, is a light, volatile product of petroleum, analogous to kerosene; chemically considered, it is almost a pure carbon; it is produced in large quantities in the distillation of petroleum, and is a common article of merchandise, readily obtained from almost all refiners or dealers in oils. The supply yearly increases, more than keeping pace with the demand, and is necessarily as inexhaustible as the supply of petroleum.

The Springfield Gas Machine consists of a gas generator—a cylinder containing evaporating pans or chambers—and an automatic air-forcing apparatus.

The general plan of setting the apparatus, and the arrangement of connecting pipes, is shown in the engravings.

The air-forcing apparatus is here seen in the cellar of the house, and connected to it and running in the ground is the air pipe conveying air from this instrument to the gas generator, located under ground, and removed from the building thirty, fifty, one hundred feet, or more.

When the machine is in operation the rotary pump forces a current of air through the gas generator; here it becomes carbureted, thus forming an illuminating gas that is returned through the gas pipe to the house, and carried by the distributing pipes in the walls and floors of the building to the burners, or it may be conducted from the gas generator to other houses in any other direction—to stables, outbuildings, or to lamps on the grounds, wherever light is required. This plan of gas making is automatic. Gas is generated only as fast and in such quantities as required for immediate consumption. The process is continuous while the burners are in use, but instantly stops when the lights are extinguished. The Springfield machine, set in this manner, is considered as safe a means of lighting as any that can be adopted; all the gasolene is kept in an air-tight vessel under ground, and removed from the building a safe distance. There is no gas in the air pump, nor inflammable material in the building, except the gas contained in the distributing pipes.

No fire is used in the process of manufacture; buildings lighted by the gas are insured at the same rates as though coal gas were used.

Several thousand machines are in successful use in every part of the country, lighting all classes of buildings.

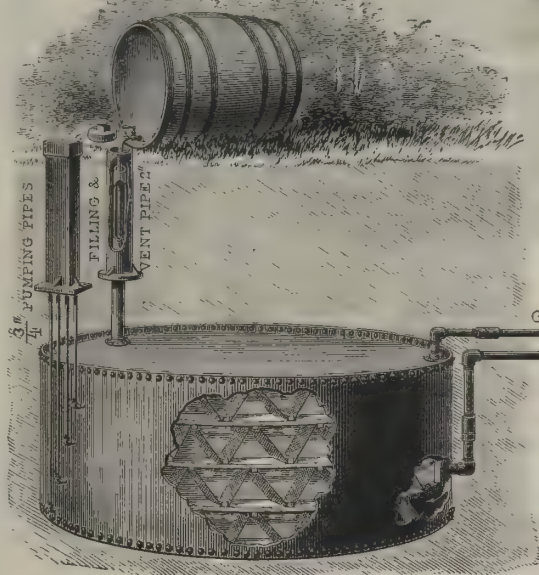
The cost of the gas per thousand feet is from eighty cents to a dollar, six gallons being a liberal estimate of the amount of fluid required to produce light equal to that from a thousand feet of ordinary coal gas.

Among the most interesting uses to which gas may be put are for cooking in the kitchen, and at the fireside.

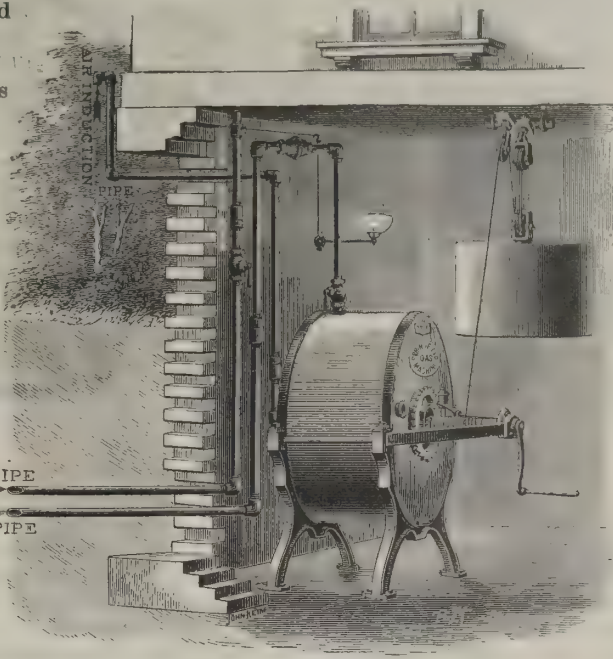
The first cost of gas ranges is not half that of good coal ranges. The exact degree of heat required for any special purpose is at once obtained. Since combustion is perfect, there is no smoke or odor, and no flue is required. The certainty of its results, its cleanliness, convenience, and comfort, are obviously in its favor. Any coal stove may be fitted with a burner suitable for burning air gas without smoke or odor.

Ordinary open coal grates furnished with a suitable burner, and filled with ragged bits of lava, which, when the gas is lighted, become incandescent, perfectly counterfeit a coal fire, and furnish an economical and abundant heat.

LARCH LUMBER.—It is



GAS GENERATOR.



AIR PUMP OR FORCING APPARATUS.

claimed that the larch which grows in Oregon is suitable for making sash, doors, and blinds, mould-

ings, etc., and a saw mill has been built in a large body of that timber near Westport. It is said that it is stronger and tougher than cedar, has no pitch, no taste or smell, takes a better finish, holds screws and nails better, and that better tenons and mortises can be made from it. It is found on the summits of Oregon mountains, sometimes in dense forests, and has an average diameter of six feet. It is not found below an altitude of from 2,500 to 3,000 feet, and is but comparatively little known. It grows to a height surpassing the Douglas fir.

The Thomson-Houston Motor for Street Cars.

The Thomson-Houston Electric Co. has just closed a contract with the McGavock and Mount Vernon Street Railway, of Nashville, Tenn., for the equipment of a part of its road. The length of the line is 3.07 miles, of which 2.3 is double track, and 0.77 single, making a total of single track of 5.37 miles. There are seven curves on the line and numerous grades, the maximum being 5½%. There will be six cars, each 16 ft. in length, and capable of carrying seventy-five passengers, and equipped with two ten-horse power Thomson-Houston motors. The overhead system will be used. This contract was not entered into until all the various systems now in operation in the United States had been carefully investigated. Electricity will not be used on the entire line at present, but a loop from Cherry Street around by the public square back to the stables. The time consumed by a car making this trip is seventy minutes. The new car will make the trip in thirty minutes.

The company has also closed a contract for the equipment of two miles of single track at Southington, Conn. The overhead line is all completed, except the curves, which are now being put in. The bracket method of suspension is used except on the curves, where the cross suspension is employed. The cars will each be equipped with two ten-horse power Thomson-Houston motors.

Hints on Plumbing and Cellars.

The advice which any sanitarian would give to any one intending to put plumbing in his house may be summed up very briefly: First, have the work arranged and carried out by some one who knows his business. Never intrust it to a tinsmith who takes up plumbing, which he does not understand, in addition to the tinkering, which he does understand; second, have no more plumbing put in than you are prepared to pay for having done in thoroughly good fashion; third, see that your plumbing appliances are properly used after they are in.

A concrete floor has just been incidentally mentioned. This is a most desirable thing to have under every house, in order to keep down

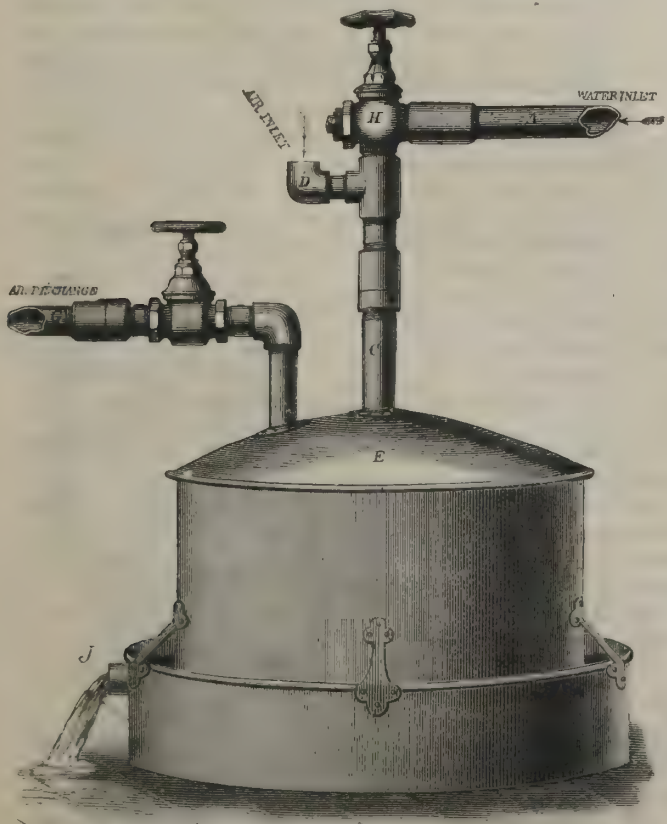
the damp ground air. For that reason it is desirable to have a cellar or basement under the whole of the house with a good concrete floor, and the ground should first be underdrained if there is any appearance of dampness or any risk of surface water flowing toward the house. It is not an unusual thing to place a hot-air furnace in a basement which has an earth floor that has been saturated with filth from leaky drains, and to draw the supply of air (to be warmed) from the cellar instead of from the open air, by a proper closed duct. This is sometimes the arrange-

ment which forms the last straw that breaks the camel's back and renders a house entirely uninhabitable until it is altered. It effectually destroys any chance of escaping from the effects of the defective drains, because the air which has been befouled by them is thus carefully collected and warmed and sent up through the registers to be breathed by the occupants of the house. No surer way could be devised of intensifying the danger arising from defective soil pipes and drains. Even if there is no plumbing or drains in the house at all, the air of the house should never be thus taken to be warmed and breathed over and over again.

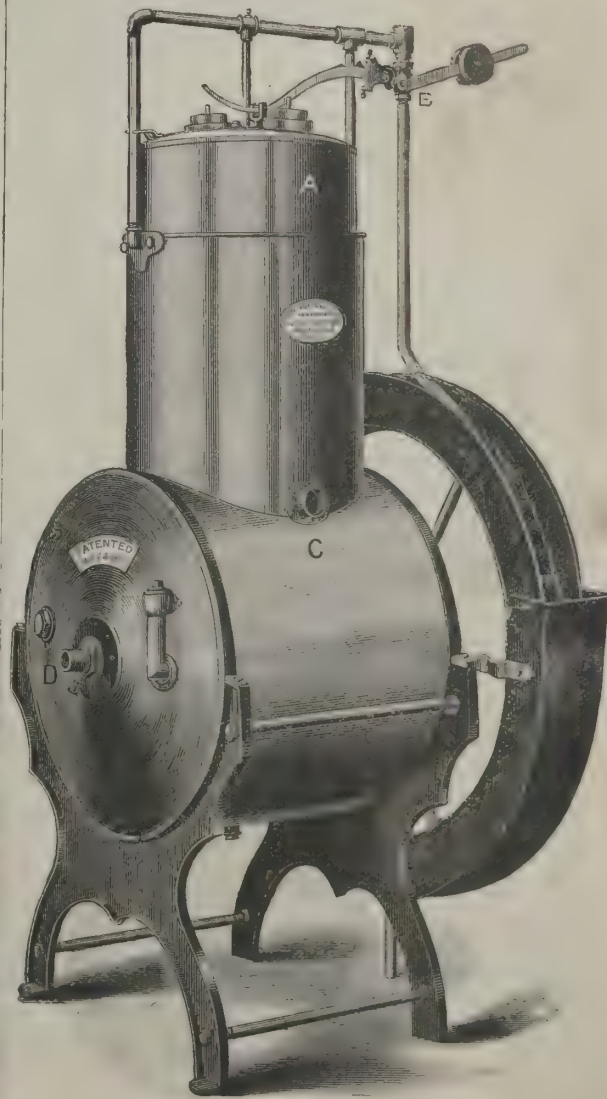
Every hot-air furnace should be provided with a duct bringing in fresh air directly from out of doors, and it ought to be brought from some point where it will be as free as possible from dust or anything objectionable.—David B. Dick, in the *Canadian Architect and Builder*.

The Fatal Climate of Panama.

The tribute of valuable lives paid to the insalubrity of the Panama isthmus has been very heavy. M. A. Nicholas, who had the organization of the sanitary measures for the protection of the workmen, states that among the European element there have been 5,200 deaths during a period of two years and three months, the burials averaging about seven per day, and the death rate being 98 per 1,000. In one station, among 159 young men specially selected for their physical vigor, 23 have died within 22 months. Among the colored workmen the loss has not been anything like so heavy, only 51 having died out of 2,100 during the period considered.



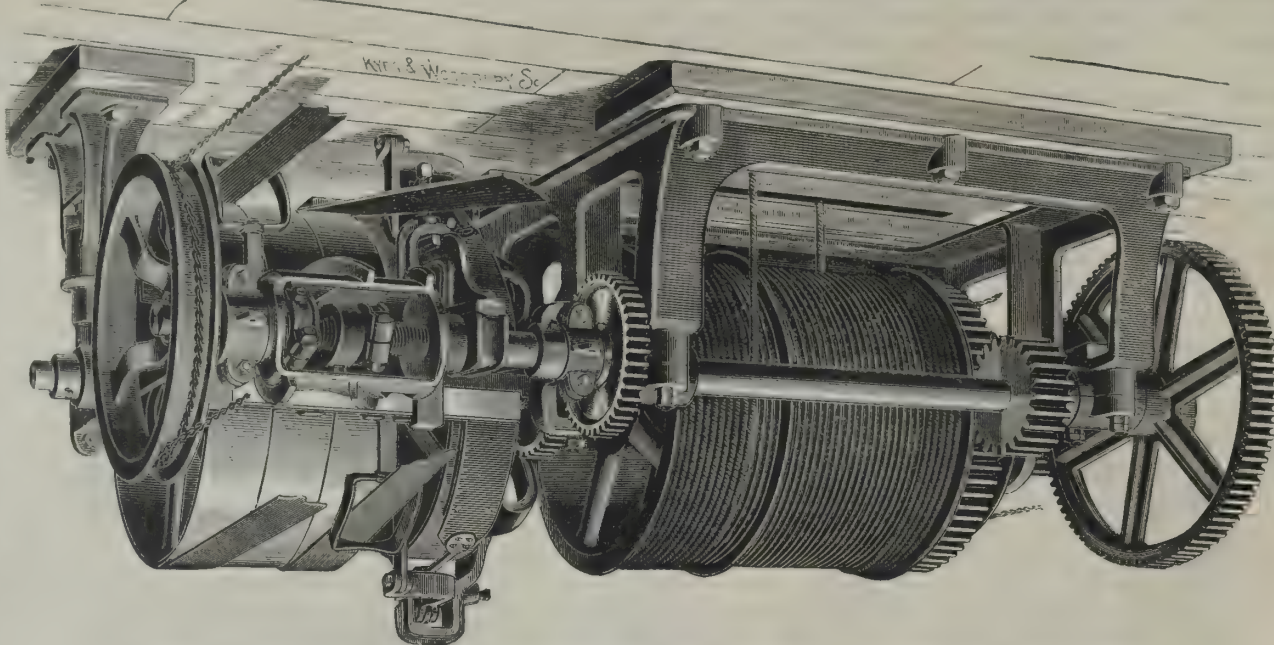
THE HYDRAULIC BLOWER—AIR CURRENT PRODUCED BY RUNNING STREAM.



AIR PUMP OPERATED BY WATER.

IMPROVED HOIST FOR PASSENGER OR FREIGHT ELEVATORS.

The geared hoist for passenger or freight elevator service shown herewith has several new features. Both pinions and gears are cut by the most approved methods, securing greater accuracy than has been attempted heretofore in the same class of machinery, and giving a smooth and noiseless motion at a high speed. It is provided with a centrifugal governor, that acts in case the belts break in descending; has slack cable device that stops the car instantly and applies the brake, keeping the cables taut on the drum when the car is obstructed in its descent. It is also provided with automatic drop forge wrought iron stop device, which absolutely prevents breakage. The machine is right or left hand, and can be placed in any position desired, as the belts will run at any angle. The pulleys are self-oiling, requiring attention only once in six months. It is manufactured by Morse, Williams & Co., Philadelphia, New York, and Boston, who also manufacture hydraulic, worm geared, and hand power elevators.



MORSE, WILLIAMS & CO.'S IMPROVED HOIST FOR PASSENGER OR FREIGHT ELEVATORS.

for mill and warehouse trucking, they are also admirably adapted for nearly all purposes for which casters are used, as on heavy show cases, heavy refrigerators, sideboards, pianos, etc.

Mr. Clark makes many styles of casters for mill and warehouse work, as well as light casters for furniture. He will mail, on application, his large catalogue of these and other specialties.

TOOL CABINET.

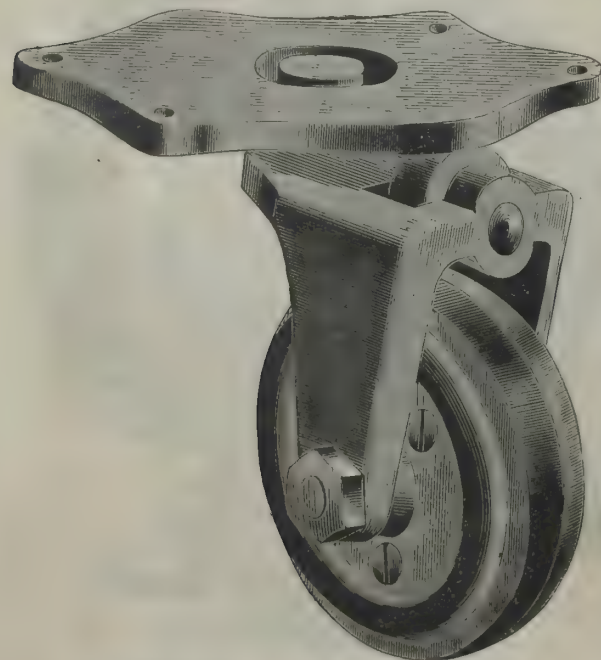
This cabinet is a work bench and tool chest combined, for the use of those who wish to do work in their houses. It is made of solid white ash, with hard maple bench plank. It is 18x34x36 inches, and is furnished with a steel-faced vise of a new pattern and patent bench stop. It has a detachable back board, with racks for tools, as shown in the cut. There are six drawers of varying depths, for holding tools, nails, screws, etc., and it is much more convenient than any tool chest now in use. Further information can be obtained by addressing the Millers Falls Co., 93 Reade Street, New York, who are the manufacturers.



CLARK'S NEW ANTI-FRICTION CASTER.

Mr. Geo. P. Clark, of Windsor Locks, Conn., manufacturer of truck and furniture casters, has just brought out several new lines of improved anti-friction casters, the construction of which is clearly shown in the accompanying cut, and may briefly be described as follows: Set firmly in the frame of the caster, over the wheel and under the top plate, is an anti-friction roller. The top plate is so adjusted that all weight comes directly on the roller, and not on the center pivot. Hence heavy trucks or furniture mounted on these casters move with much less friction, and can, consequently, be handled with less exertion than is required where ordinary casters are used.

Two lines of these casters are manufactured, one being fitted with plain iron wheels and the other with the Clark noiseless rubber-tired wheels. The latter have superseded iron wheels in many mills and ware-



CLARK'S NEW ANTI-FRICTION CASTER.

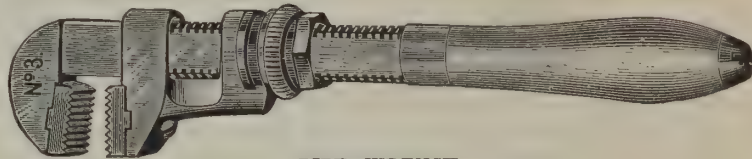
houses on account of their noiselessness and the fact that they do away entirely with the wearing and splintering of floors experienced where iron wheels are used. While these goods are particularly well suited

ment of which the tunnel is being driven. The tunnel now penetrates this slate body thirty-five feet, at a distance of 350 feet beneath the surface of the ground. From the general formation of surface rock it is calculated the lode will continue 60 feet in width.

PIPE WRENCH.

The mechanism of this wrench is such that the jaws, when not in use, stand obliquely or wedge shaped, thus giving to their inclination the widest opening at that point which receives the pipe or body to be turned. This allows an instantaneous application without action or retroaction of nut or sleeve in receiving or disengaging the work. When the wrench is in use, the operation on the spring in the movable slide gives the pipe an inward tendency or rolling motion toward the bar, thereby tightening its grip on the same, but upon re-

lease of pressure, the jaws, through the spring, resume their natural position, no use of the nuts being needed except to change the relative position of the jaws for different sizes of work. The serrated jaws of the wrench are interchangeable, so that, if one plate is broken, another can be furnished adapted to either jaw without express designation. The slide nuts and various parts are also interchangeable. So these wrenches can be repaired at small expense. This wrench is also made with a long nut or sleeve. These wrenches are made by the Bemis & Call Hardware and Tool Co., of Springfield, Mass., who manufacture



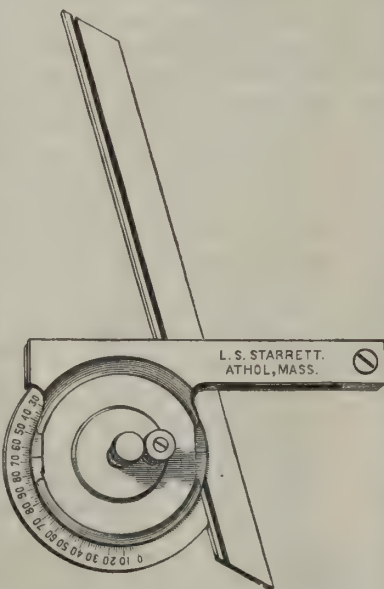
PIPE WRENCH.

Projected Sash and Blind Factory.

Messrs. Hartman & Durstine, of Wooster, O., manufacturers of Hartman's patent sliding blind, report a constantly increasing demand for their goods. These blinds are to be placed in a government building at a military post in Colorado, at a cost of \$1,500. Owing to the growth of their business, this firm has concluded to establish a branch manufactory at some point not yet determined upon. Cities and towns that can offer inducements to manufacturers to locate with them are invited to correspond with this firm.

UNIVERSAL BEVEL PROTRACTOR.

The bevel protractor shown in the accompanying illustration is one of the most carefully made tools among the many produced by L. S. Starrett, of Athol, Mass. It weighs but six ounces. The blade is 7 in. by half an inch, the stock 4 inches long, and both are made from sheet steel, nicely finished. The disk is graduated in degrees from 0 to 90 each way, and rotates the entire circle on a central stud inside the case. The blade may be slipped back and forth its full length, or turned at any angle around the circle, and firmly clamped at any point, adapting it for work in positions where others cannot be used, and rendering the common universal bevel (for transferring angles) unnecessary. As one side of the stock is flat, it makes a convenient tool for laying on paper in draughting, and has double the utility of any tool of the kind in the market. L. S. Starrett has issued a very nicely illustrated catalogue of fine tools and steel rules, which will be forwarded on application.



UNIVERSAL BEVEL PROTRACTOR.

California Slate.

The El Dorado Big Tunnel and Mining Company, which is driving a tunnel 3,400 feet in length on its mining ground, about a mile and a half north of Placerville, El Dorado County, has struck, at a distance of 470 feet from the mouth of the tunnel, an immense body of superior slate, which bids fair to exceed in value the gold-bearing quartz lodes for the develop-

a large variety of wrenches and other tools. Their combination wrench combines all the qualities of a cylinder and gas pipe wrench and a regular nut wrench, being very largely used. They issue an illustrated catalogue, which they will send to applicants.

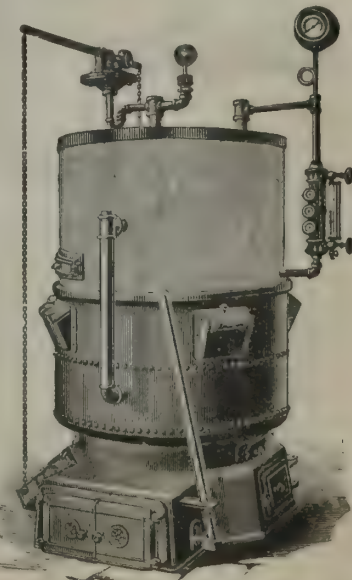
IMPROVEMENTS IN THE "GORTON" BOILER.

The Gorton & Lidgerwood Company, 96 Liberty Street, New York, manufacturers of the well known "Gorton" steam heating boiler, are constantly making improvements and alterations in their specialty, as experience shows them to be necessary or desirable.

They have recently perfected and now furnish with all their boilers a new style base, with improved upright lever attachment for shaking the grate. This is a great convenience, and obviates the necessity of stooping in order to shake the grate, as was necessary with the old style base. There is also a separate draught door, as shown in the engraving, which is attached to the automatic damper regulator, thus leaving the ash-pit doors to be used only for the purpose of removing ashes. Small doors have also been provided at the sides above the grate, so that in case the grate gets clogged, which seldom happens, a bar can be inserted and the clinkers broken up.

The "Gorton" has been before the public four seasons, and, as is generally known, is a very popular boiler. It may be used for general manufacturing as well as for house-heating purposes, being fully guaranteed for a working pressure of one hundred pounds.

Any further information desired by our readers regarding this new style base will be cheerfully furnished by the company upon application.



NEW STYLE BASE OF "GORTON" BOILER.

F. W. DEVOE & CO.

(Established 1852)

PURE MIXED PAINTS

We desire to call attention of consumers to the fact that we guarantee our ready mixed paints to be made only of pure linseed oil and the most permanent pigments. They are not "Chemical," "Rubber," "Patent," or "Fireproof." We use no secret or patent method in manufacturing them by which benzine and water are made to serve the purpose of pure linseed oil. Sample cards, containing 50 desirable shades, sent on application.

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OUR STAINS are made from the best English Colors and pure Linseed oil with a small proportion of petroleum which serves to preserve the wood as well as the color. They do not contain any "gas oil" or "dead oil" which has the smell of Cressote, and we guarantee that all our samples have been dipped in our original stain.

WE CLAIM superiority of color which will not wash off and will retain its brightness long after other stains have faded or turned black. Our Stain has been thoroughly tested by many of the leading Architects in this country during the past four or five years, and we have received many flattering testimonials. We will send a package of Stained Boards, by mail, to any address, on application. These small Sample Boards give but an imperfect idea of the beauty of the Stain as the effect of Stained Shingles can only be seen in a mass on the house.

ONE GALLON OF OUR STAIN will dip about 500 Shingles, or cover about 1500 shingles, when brushed on. Please note number on Sample Boards. We would advise Architects to specify as follows:

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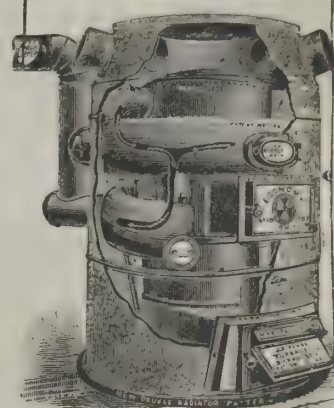
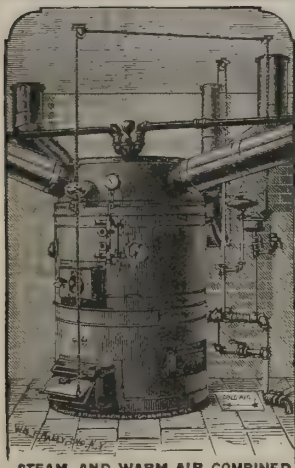
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It is made either right or left hand, single oven, with or without water-back, and with or without elevated warming shelf.

It has all the new features combined in one range; namely, a hinged slip plate, allowing the whole surface of fire to be exposed for broiling; a lift-out bottom oven plate—an entirely new feature; the whole bottom of the oven lifts out, enabling the flues to be cleaned, as well as the bottom oven plate itself; it has a front feed door, making it unnecessary to remove covers to put on coal.

As a Brick Set Range,

it requires no brick work except the jambs, all the flues being in the body of the range. Therefore it can be set by any bricklayer.

It is made either right or left hand, single oven, with or without water-back, and with or without elevated warming shelf.

We make these ranges either with the Draw-bar shaking grate, Duplex grate, or our Automatic grate, all being interchangeable.

The doors are all fitted with our patent hinge, which insures successful operation both in the oven and fire, the doors always fitting, allowing no escape of heat or gas.

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SHOULD ALWAYS SPECIFY
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where hot and cold water is used, to prevent high pressure on boilers, and insure against bursting of pipes. Gives a uniform pressure throughout the building.
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Machines for ripping, cross-cutting, scroll-sawing, mortising and tenoning, forming edges, grooving, gaining, rabbeting, cutting dados, and turning. Builders use our Hand Circular Rip Saw for the greater portion of their ripping in preference to carting their lumber to a mill five minute's drive from their shops. The same is true in regard to scroll sawing, mortising, tenoning, cutting stuff for drawers boxes, etc. Builders using these machines can bid lower and save more money from their contracts than by any other means.
Read the Following Letters from Builders:
CLARENCE F. LEE, carpenter and builder, Morristown, N. J., says: "I have had one of your Hand Circular Rip-Saws for about three months, and am much pleased with it. Have done the ripping for 15 houses in that time, which is over forty miles through inch boards. Have ripped as high as 3-inch plank. Table is also good for rabbeting; having rabbeted all jambs and sawed all drips for 200 windows."
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The purchaser can have ample time to test them in his own shop and on the work he wishes them to do. Descriptive Catalogue and Price List Free.
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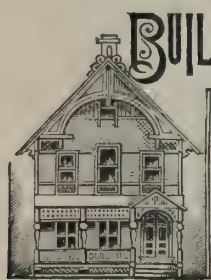
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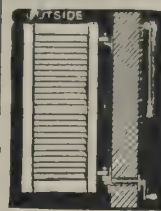
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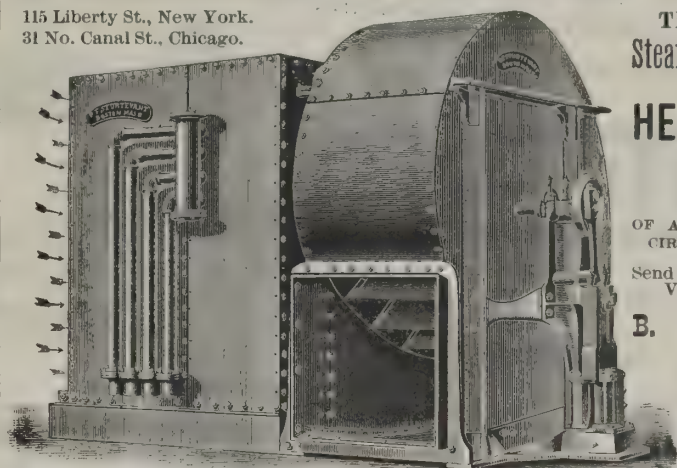
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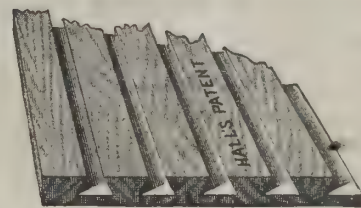
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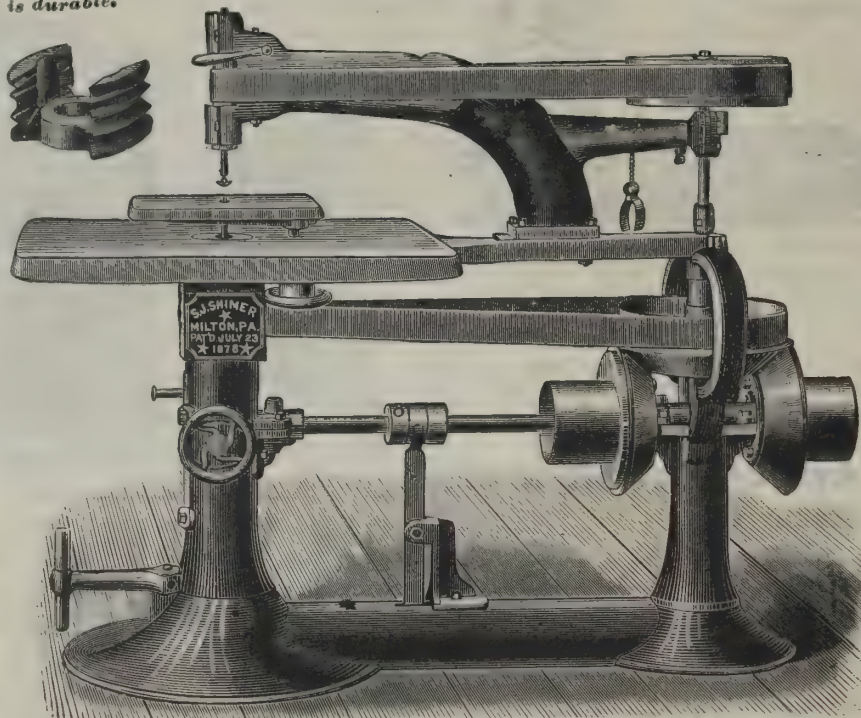
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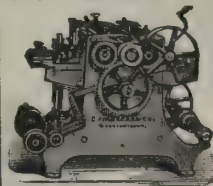
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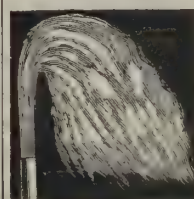
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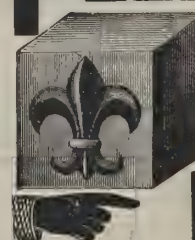
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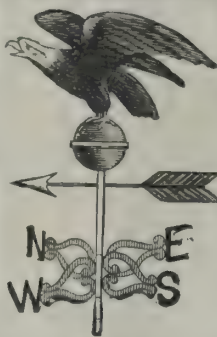
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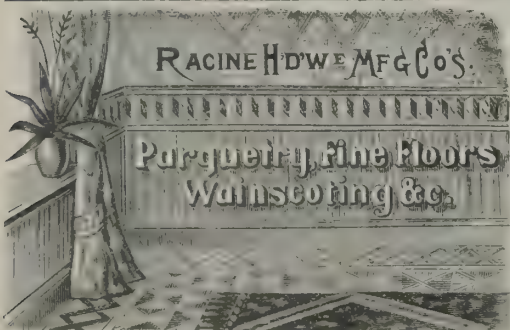
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(1) C. C. C., of Lacon, Illinois, asks if there is any method of removing lime suspended in a cistern. The latter was cemented and left six weeks to dry. The work was done by experienced masons. A. It is the custom to pump out the water that first accumulates, as fresh cement is attacked by rain water. Some of the lime of the cement is dissolved out and remains for some time suspended in the water. A small amount, say one-half ounce to a gallon of sulphuric acid, will precipitate the lime. The contents of the cistern should be stirred up with a pole after the admission of the acid, in order to bring the acid into intimate contact with the lime.

(2) C. E. M. asks: Can a load be drawn over the road easier upon a wagon that has wheels 4 feet in diameter than upon one with wheels 2 feet in diameter, and if so, in what proportion? A. There are several phases of this question that modify somewhat the possibility of a general answer. The larger wheel is necessarily the heavier, and thereby makes more load. The friction of the axle is easiest overcome in the large wheel. Roughness of the road is also favorable to easy draught with the large wheel. The difference due to friction of axle is very small and in favor of the larger wheel. Probably five per cent, would be a fair average in favor of the larger wheel—all points considered.

(3) S. S. B. writes: Please give directions for ventilating a dry room. I want to know the correct method of removing vapor or dampened air from an artificially heated room used for drying fabrics, yarns, fibers, etc. Where should fresh air be let in, if at all, and where let out, or should the damp air be removed by exhaust from floor? If so located, at what height from floor? A. Drying rooms should have a fresh air inlet immediately beneath the source of heat. If a stove is used, it should be so arranged that the air shall enter and surround the stove and receive its heat before spreading into the room. If steam coils are used, they should be placed or spread a few inches above the floor, with the fresh air entering and spreading under the pipes. The amount of air passing through a drying room should not be so great as to depress the temperature to a degree that will lessen the time of drying, which should always be regulated to suit the amount of heat and the proportion of water to be evaporated. Very wet goods require strong heat as well as rapid circulation. The exit holes should be so distributed as to force the current through all parts of the room alike, especial attention being given to induce circulation of air in the corners. For goods that have passed through a wringer or centrifugal, the room should have a temperature of from 130 deg. to 140 deg., with vent openings of one square foot to a thousand cubic feet of space, with natural draught due to the height of the room only. This can be increased by a flue or fan if enough heat is developed to keep up the temperature and thus expedite the work. The practice with some establishments is to close the room entirely with a full charge and heat the contents up to 175 deg. and then ventilate, when the goods apparently steam themselves dry. This cannot be done if goods are required to be constantly fed to and withdrawn, as in the laundry business.

(4) J. S. asks: 1. Will you describe the method usually employed of manufacturing plaster of Paris? A. It is made by grinding and heating gypsum. 2. Can it be made in any other way than by burning gypsum? A. It is made by no other method. 3. What books describe "burning lime" or "burning alum," or making plaster of Paris? A. Spon's Encyclopedia, which we can supply for 75 cents in parts, contains treatises on plaster of Paris and lime. The burning of alum is described in the United States Pharmacopeia, which you can consult in any drug store.

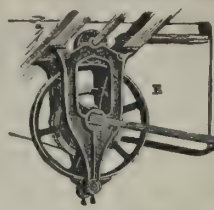
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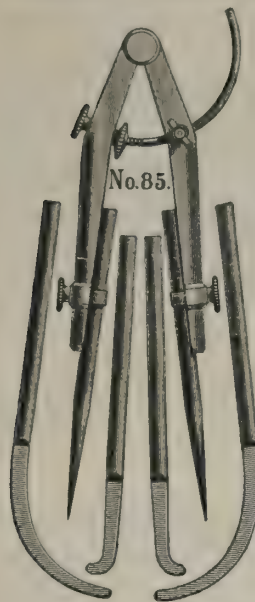
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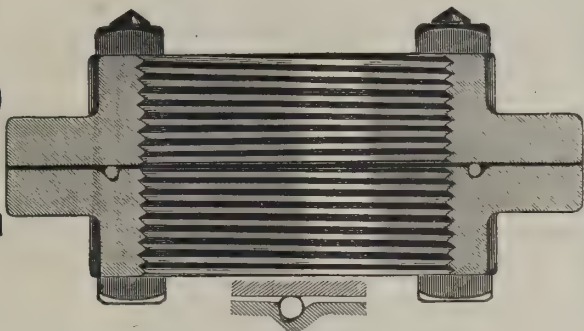
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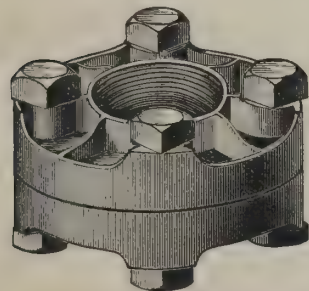
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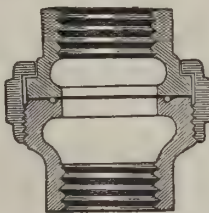
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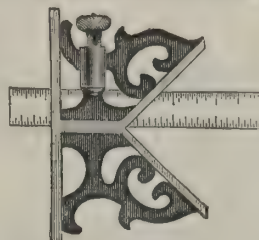
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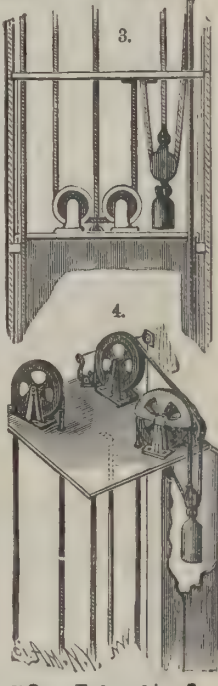
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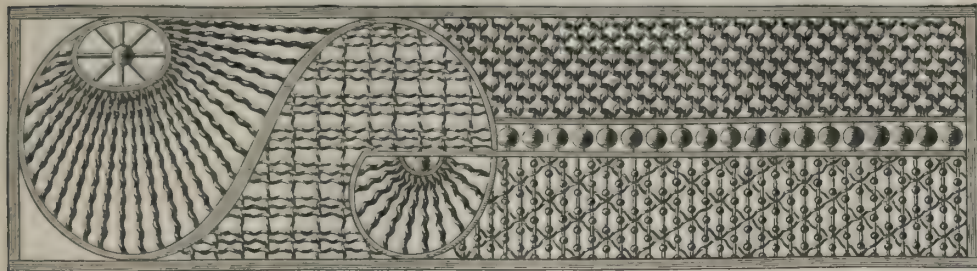
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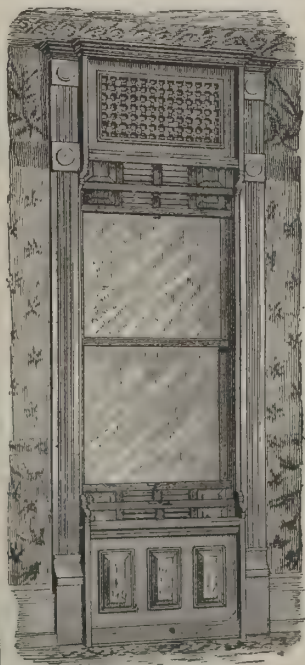
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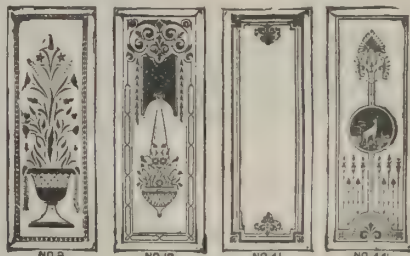
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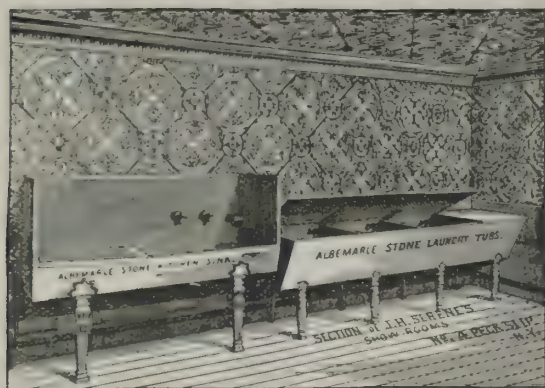
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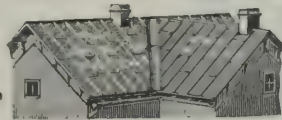
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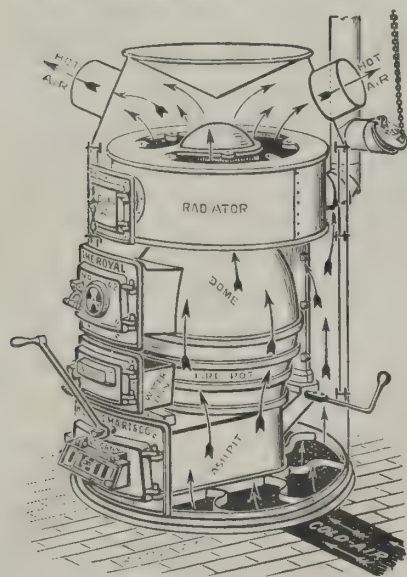
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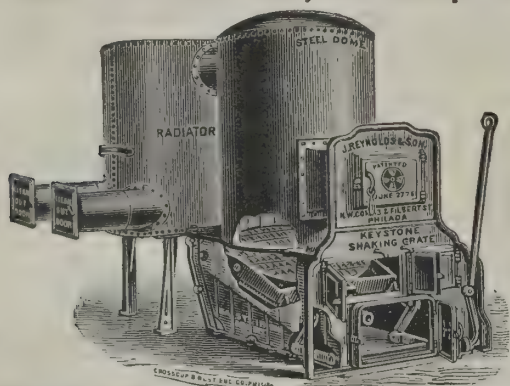


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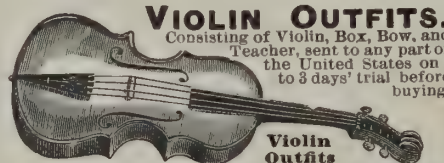
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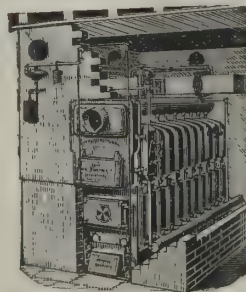
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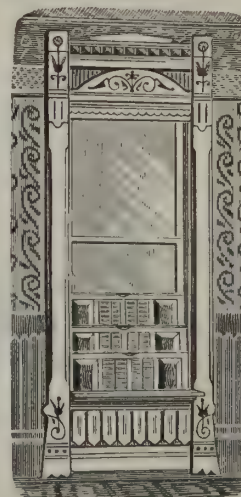
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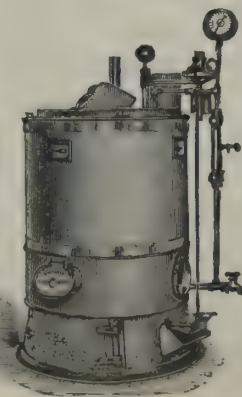
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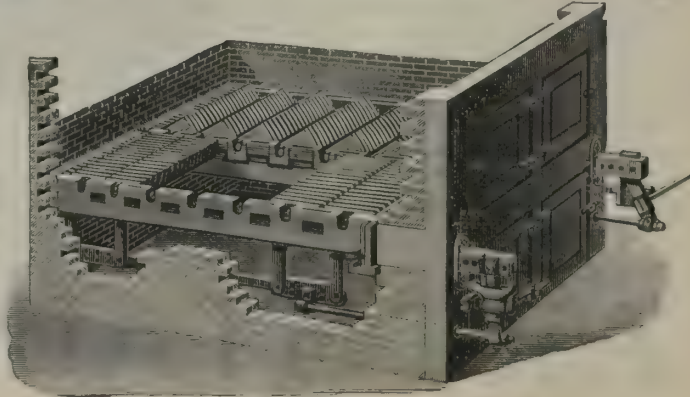
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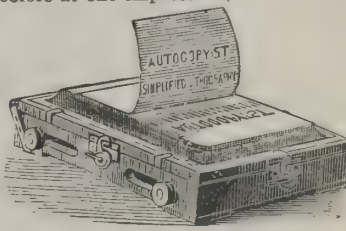
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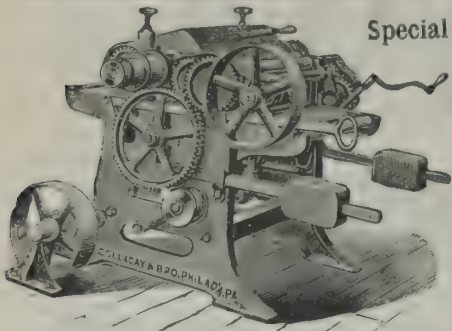
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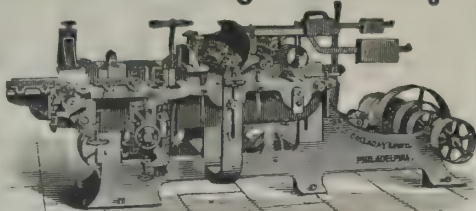
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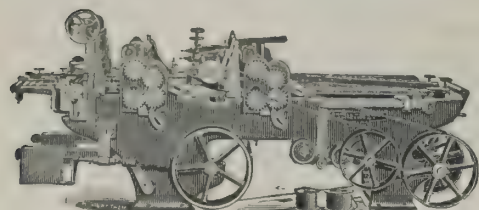


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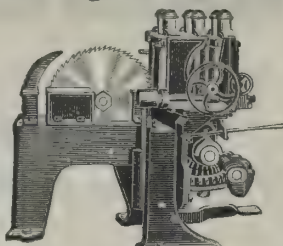


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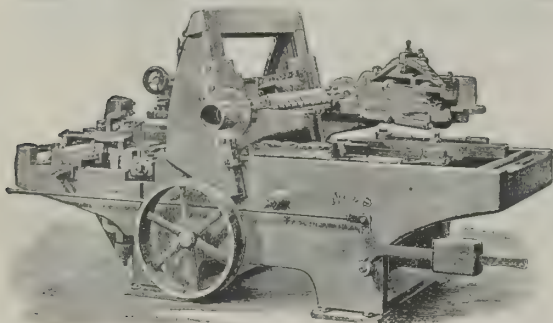


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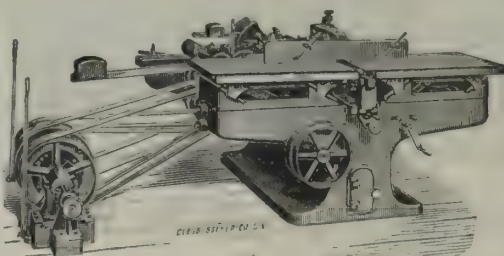
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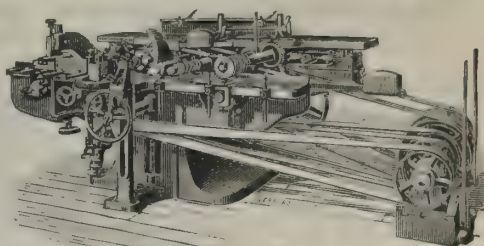
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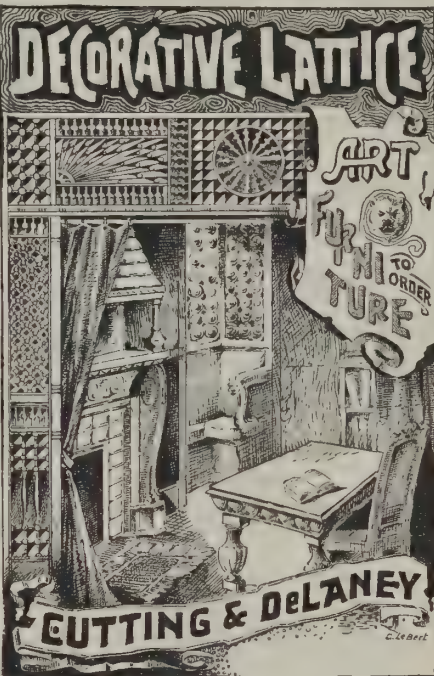
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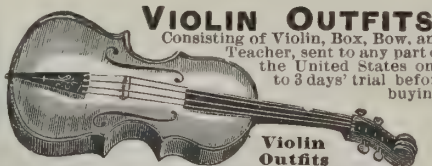
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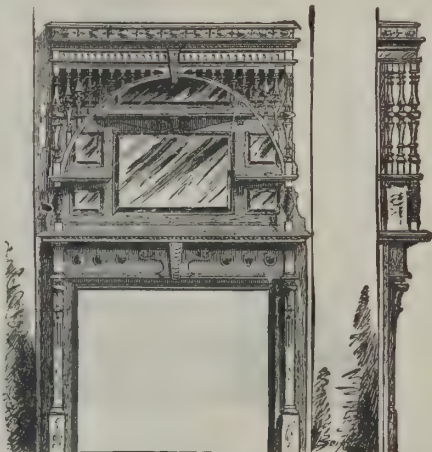


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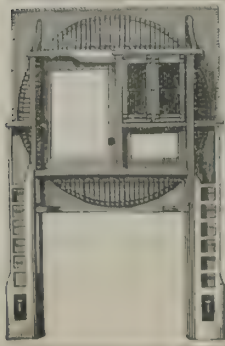
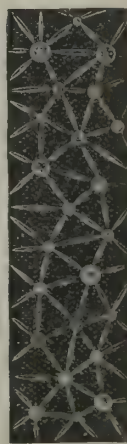
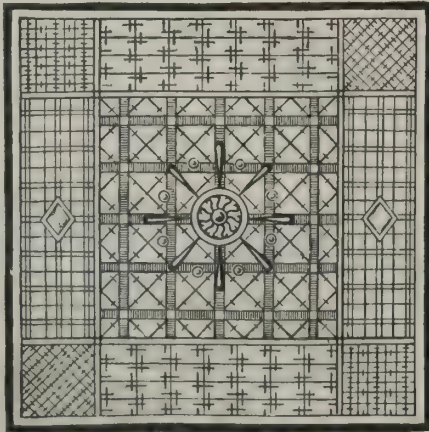
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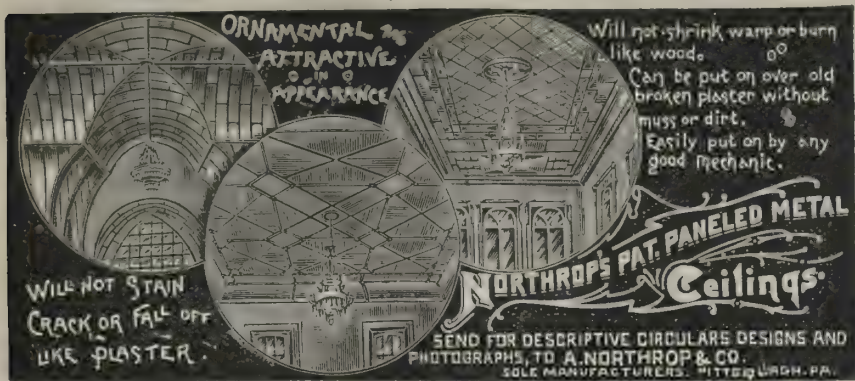
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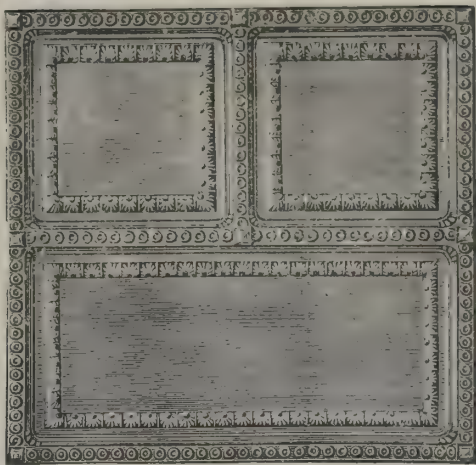
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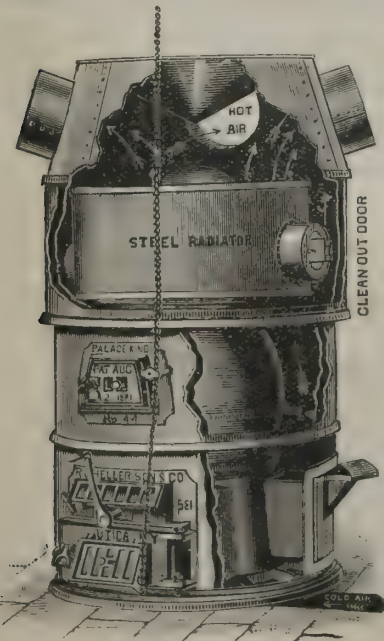
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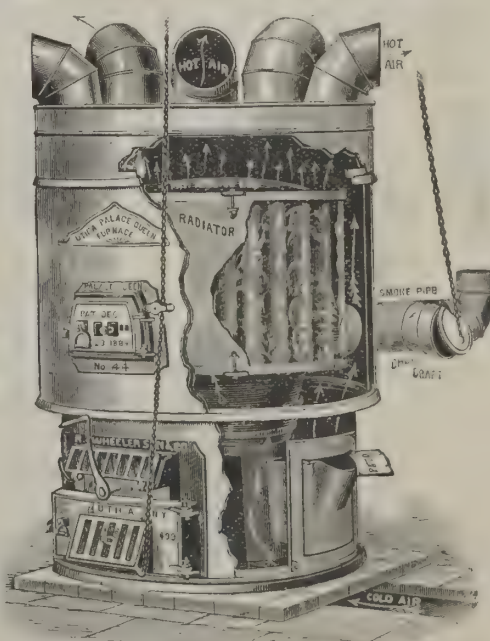
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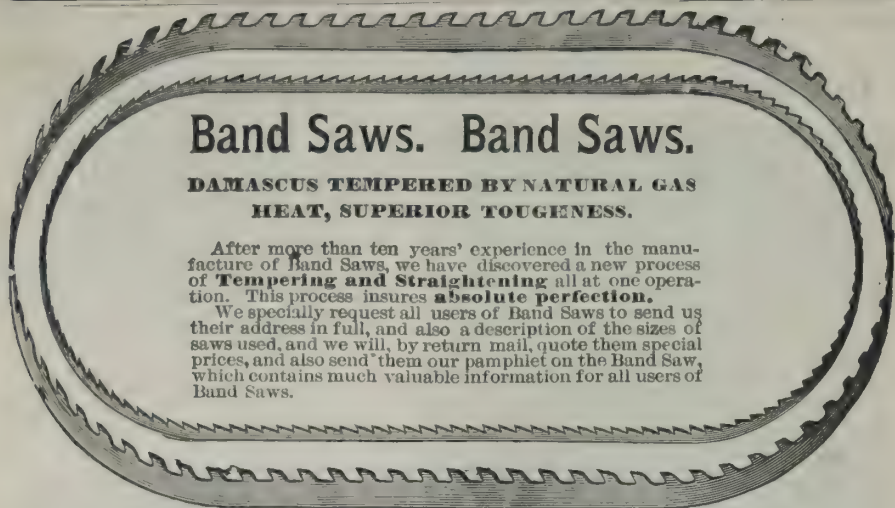
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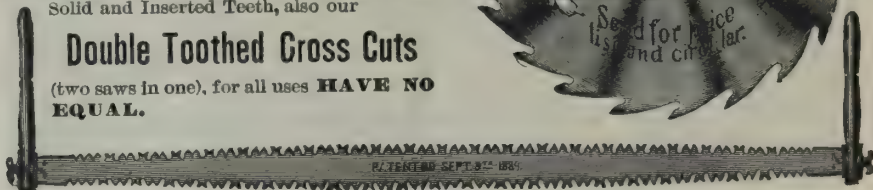
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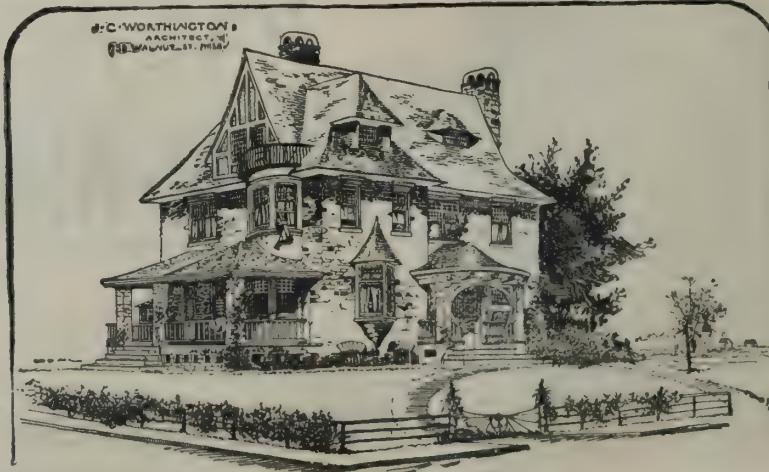
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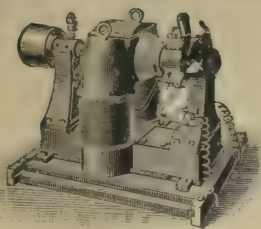
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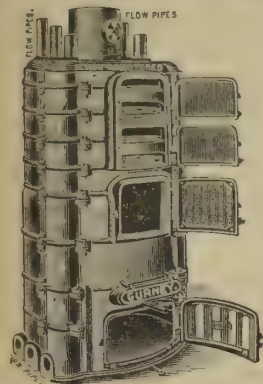


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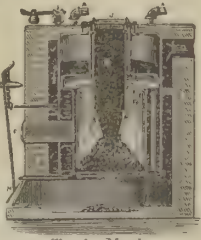
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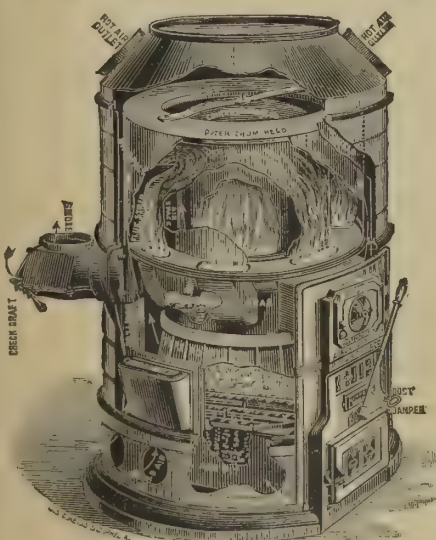
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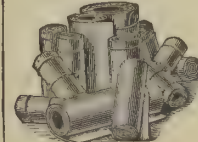
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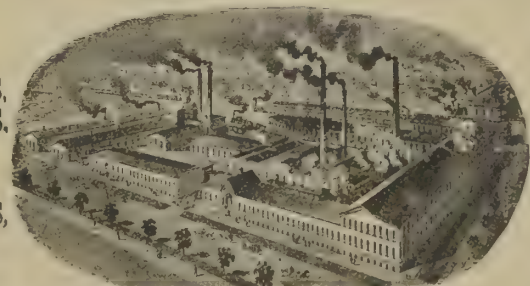
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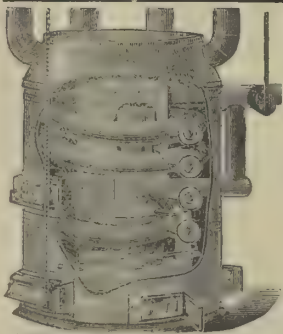
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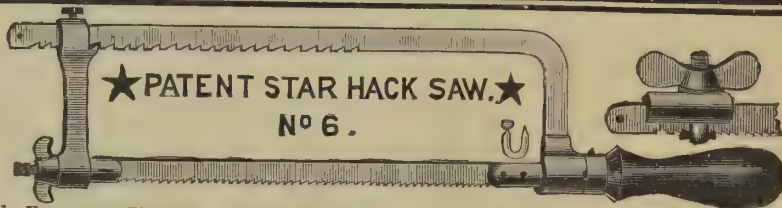
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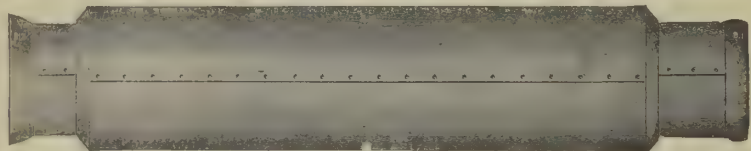
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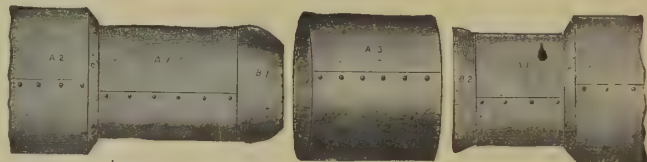
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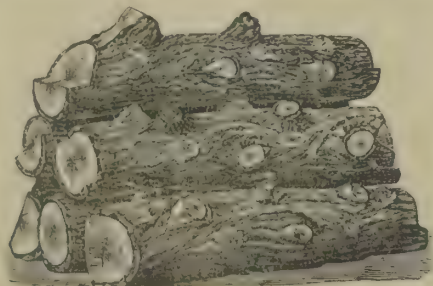
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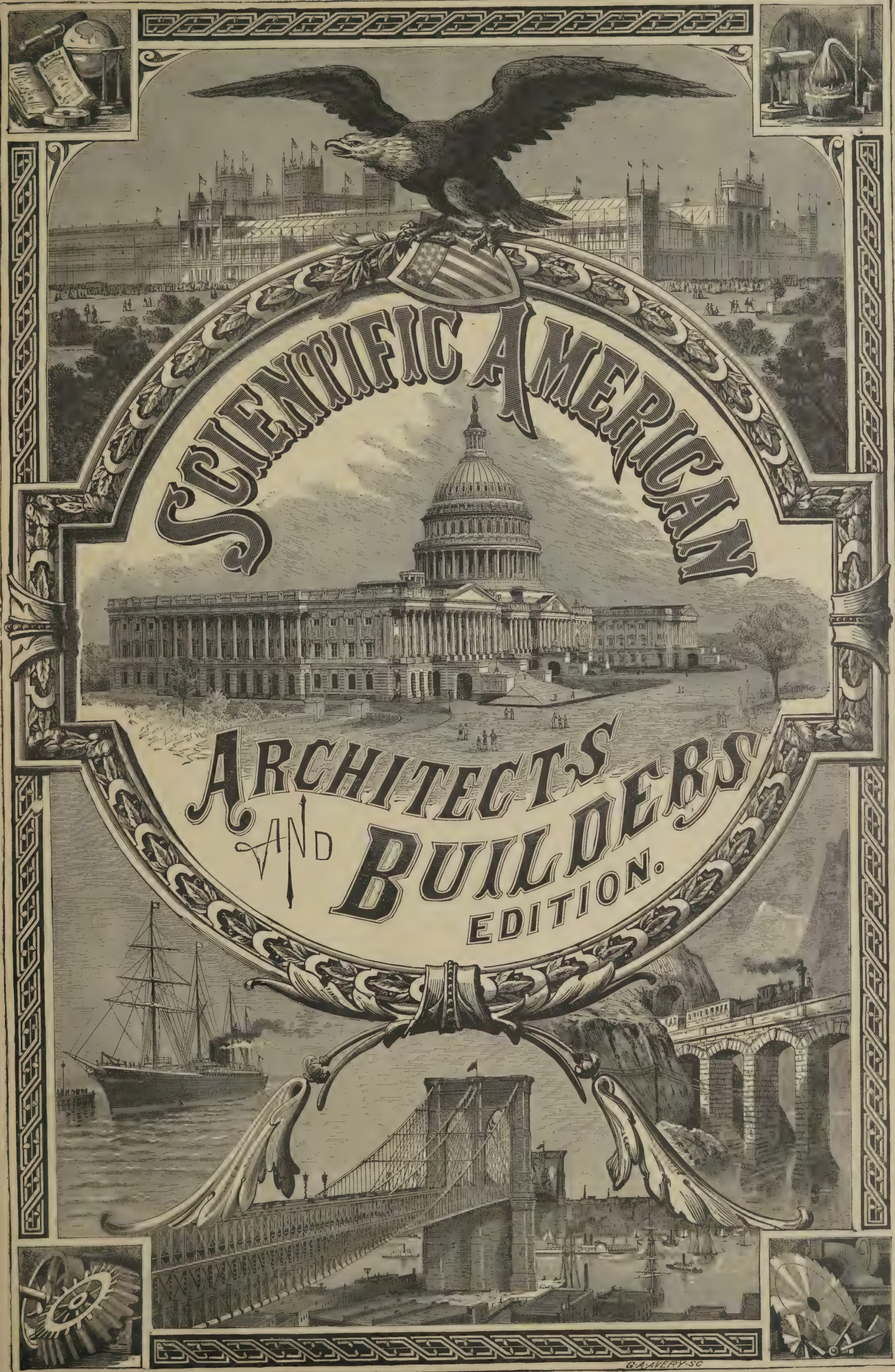
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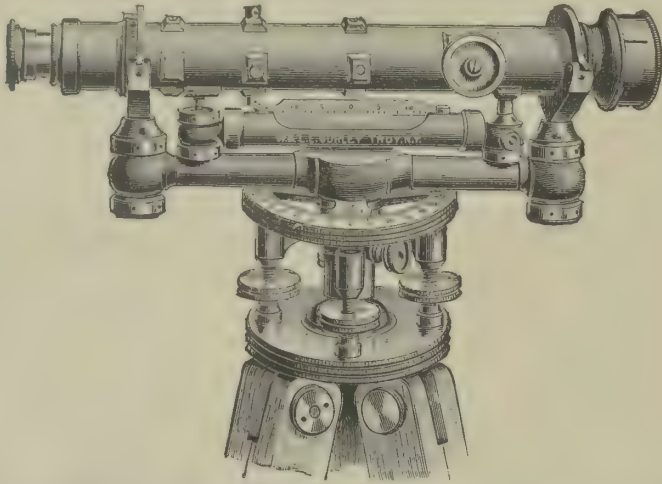
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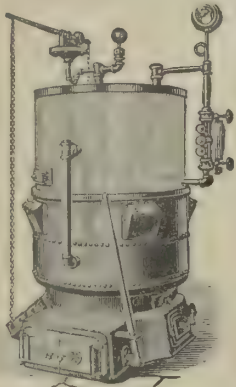


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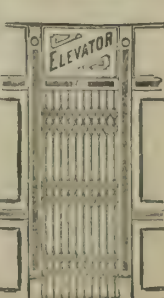
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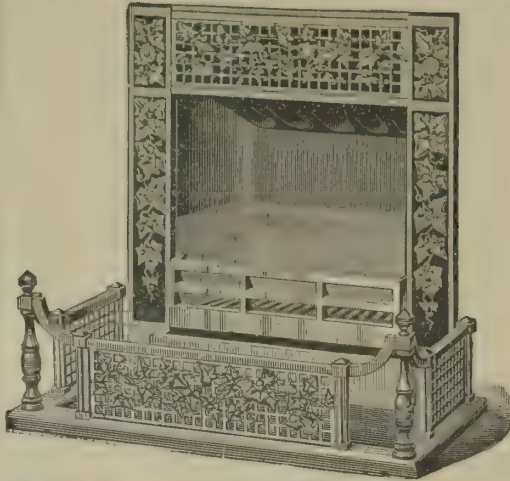


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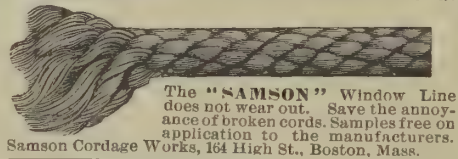
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FRANK B. MALLORY.

HIRES & CO. LIMITED,

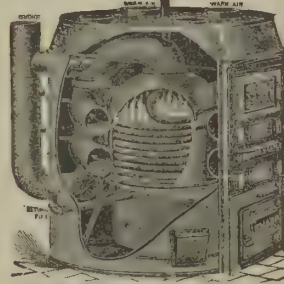
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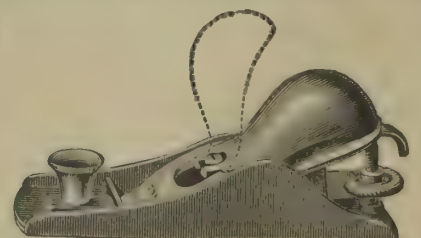
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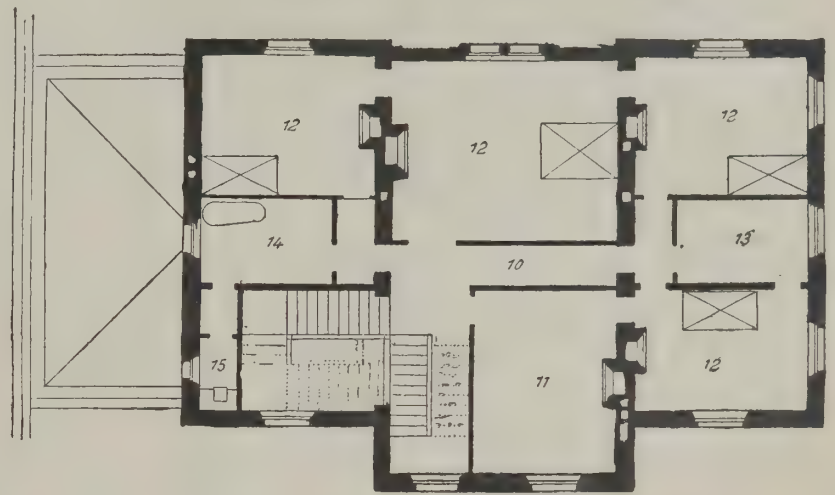
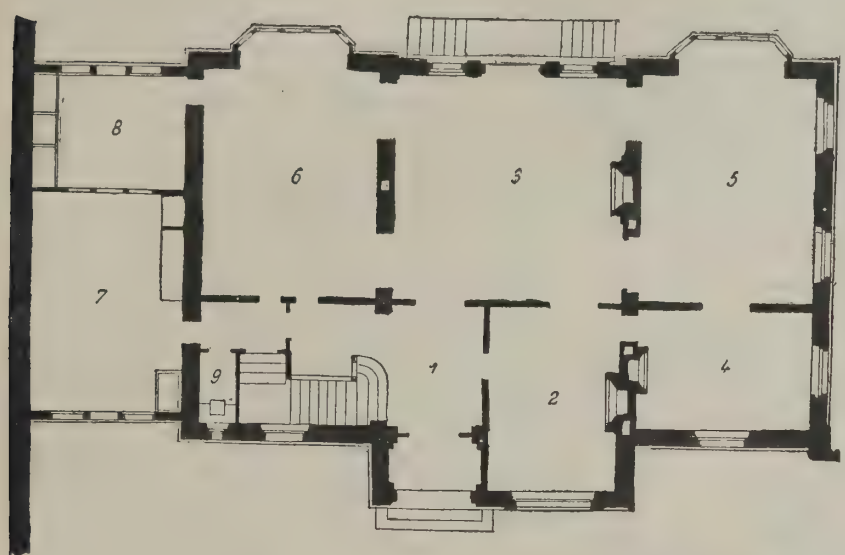
Stanley's Knuckle-Joint Block Plane.



The knuckle-joint in the cap makes it a lever, too; and the act of placing the cap in position, will also clamp the cutter securely in its seat.
 No. 18. Knuckle-Joint Plane, 6 in. Length, 1 1/2 in. Cutter, Lateral Adjustment, Nickel Plated Trimmings... \$1.75

SCIENTIFIC AMERICAN

Entered at the Post Office of **ARCHITECTS AND BUILDERS** New York as Second Class Matter.
Vol. VII. Subscription, \$2.50 a Year. NEW YORK, MARCH, 1889. **EDITION.** Single Copies, 25 Cents. No. 3.



A PARISIAN VILLA.
[For description see page 38.]



Scientific American.

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O. D. MUNN.

A. E. BEACH.

NEW YORK, MARCH, 1889.

THE

Scientific American,

ARCHITECTS AND BUILDERS EDITION.

\$2.50 a Year. Single Copies, 25 cents.

This is a Special Edition of THE SCIENTIFIC AMERICAN, issued monthly. Each number contains about forty large quarto pages, forming, practically, a large and splendid Magazine of Architecture, richly adorned with elegant plates in colors and with fine engravings; illustrating the most interesting examples of modern Architectural Construction and allied subjects.

A special feature is the presentation in each number of a variety of the latest and best plans for private residences, city and country, including those of very moderate cost as well as the more expensive. Drawings in perspective and in color are given, together with Floor Plans, Specifications, Costs, etc.

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A LIEN LAW FOR GRAVESTONES.

By the terms of a law recently enacted in the State of New York, persons who furnish gravestones and monuments may have a lien upon the same if they set up a claim for non-payment. It is made the duty of the person who has charge of the grave yard or cemetery to notify the lot owner of the filing of the lien. If the amount due is not paid within six months, the claimant may, at his pleasure, walk into the grave yard, with his tools, machinery, and helpers, and remove the gravestone or monument, and the owners of the cemetery must not say boo to him. The claimant is not to be subject, in his removing operations, to any rules or regulations, but may make as much dirt, cut up as many didos, and do as much mischief as he pleases.

He is not obliged to slick up his leavings, or compensate the cemetery owners for their work in doing so. Some of the stone cutters desire that similar laws should be enacted in other States.

We think it would be better, as a protection to dealers in gravestones and monuments, to pass a law prohibiting them from erecting such structures in any cemetery unless they first file a sworn certificate with the cemetery owners, showing that the stones have been fully paid for and no claims thereon exist.

There is something extremely repulsive in the New York law, which virtually authorizes any noisy or mercenary claimant to break in upon the sacred precincts of a grave and disturb the place of repose of the dead, for the purpose of collecting a disputed debt. The law ought to be corrected or repealed. Surely the claim should be put into the form of a judgment before such outrages are permitted.

A HOUSE FOR \$5,000.

One of our colored plates this month is illustrative of the elevations and plans of an attractive residence costing about five thousand dollars.

Size of Structure.—Front 30', side 49', not including bays and veranda.

For Size of Rooms, see floor plans.

Height of Stories.—Cellar 7', first story 10', second story 9'.

Material.—Foundation stone, first and second stories clapboarded; above second story, shingles; roof shingled.

Special Features.—Large hall and vestibule, staircase. Parlor, library, and dining room connected by sliding doors. Open fireplaces in parlor and library. Front balcony, good closet accommodation.

On page 45 we give a sheet of details, from which the builder can readily make enlargements to full size.

A COTTAGE FOR \$3,000.

This month we publish plans, elevations, details, and colored plate of a cottage for \$3,000. The plan is for a simple dwelling with spacious hall, parlor, dining room, and kitchen. It is well adapted for the sea side, or any elevated position.

There is an extensive piazza to the sea front, and two moderate sized ones on the inland elevation, affording ample opportunity to evade the sun in any portion of the day. The view shows the dwelling perched on an eminence. This would make a very pleasant situation in the extreme hot months of the year. Of course the dwelling could, with slight alteration, be adapted for a level site, but the object in showing the building on this particular site was to add to the picturesqueness of the picture, and it is no difficult matter to obtain scores of such sites on the coast if desirable.

There is no basement intended, as these cottages, as a rule, are only occupied during the summer months; therefore, no great amount of storage room is necessary.

The angle tower would make a very pleasant look-out, but if the cost had to be reduced, this could be omitted.

The details and drawing illustrate fully what the work is intended to be, as they are drawn to scale, and if enlarged would make the working drawings necessary for the carrying out of the work.

The materials proposed to be used in the erection of the dwelling are as follows:

The foundation would be in random rubble, set in cement mortar. This would be necessary, as the foundations generally are very loose in these localities, and something substantial is necessary to form a tie or binder to the structure to be placed above. The plate would be laid on the masonry, laid also in cement mortar, and firmly secured at the angles. The size of plate should be at least 4" x 8".

The skids, 4" x 6", would be let into this and securely spiked down. The floor beams for the first floor would also rest upon the plate. The floor beams should be 12 x 2, with at least two rows of bridging firmly nailed. Care should be taken to have the air grids placed at the best positions possible for the ventilation of the beams to this floor, in the space underneath, as dry rot is very apt to enter upon timbers in situations of this kind, on account of the varying moisture of the subsoil, and on no account should the beams be left without a thorough current of fresh air being supplied by means of grids underneath the beams.

Cases are very common where dry rot has set in a

building in the first story, and the fungus within the short period of three months has crept up the timbers, and even in many cases between the plaster and brick work of walls, right into the roof timbers, leaving them totally unfit to carry the weights and strains originally intended in the construction, and the consequence is the ridge of the roof becomes twisted into all kinds of grotesque shapes, even if it is not followed by more serious results. For instance, a building placed in an exposed situation of this kind has to stand all the various and different changes which are constantly occurring in the weather. Thus, supposing a building is eaten by dry rot. First, we get a rain storm, then burning sun. This causes sad havoc with timbers affected with rot. Then this is followed up by another change, say a gale of wind. In the condition the heavy timbers for the roof are in, it is extremely probable, under circumstances of this kind, that a total collapse would be the result.

The building is intended to be covered with clapboarding, and would be effective if colored as near as possible to the tints shown on the colored plate.

The roof should be stained red. This would make a pleasing contrast to the cooling shades of the sea.

For details see plate on page 49.

A VILLA AT PARIS-AUTEUIL.

What a charming quarter of Paris that is which is called Auteuil! Pretentious houses, villas, and parks and gardens of all sizes are met with at every step, and elegance and picturesqueness abound there. Every day there are new structures erecting, in which architecture gives free scope to a fancy free from the shackles placed upon it by city ordinances in the great arteries of the center of the city.

As shown in the perspective view of the rear of the villa in Fig. 1, Mr. Paul Sedille, one of the most zealous seekers after polychromic effects due to the very nature of the materials, has endeavored to make a rational association of stone and brick, enriched with glazed terra cotta, and, in some parts, with marble and mosaics—all of them durable elements of decoration and coloration.

Let us hasten to add that our confrere has carried out his purpose in the happiest manner.

Profile of plan and elevation, variety in the openings, coloration—all this has been combined in a way most agreeable to the eye. The distribution of the plan, too, appears to us to have been very judiciously done, with a view to comfort (Figs. 2 and 3). On the ground floor there are large reception rooms, a study, a library accessible from the vestibule, and a kitchen on a level with this floor, but apart from the building itself and having an easy communication with the dining room. On the second floor there are beautiful bed rooms, with a parlor for intimate friends, a toilet room, and a bath room. The third floor is occupied by guest chambers and servants' rooms. The basement is devoted to the domestic services.

This villa was built in 1885-86. The cost of the construction of the building properly so called was, altogether, \$26,640.

The cost of constructing the surrounding garden wall and gate, and of planting the garden, was about \$3,400, making a total cost of \$30,040.—*La Semaine des Constructeurs*.

[FOR THE SCIENTIFIC AMERICAN.]

How to Save Ceilings when Cracked, Sagging, and Ready to Fall.

The ceiling must be first pressed back firmly into place. To do this take two pieces of scantling, long enough to reach over the defective part. Nail upon them laths about two or three inches apart. Place this framework, lath side up, against the plastering above them. With other pieces of scantling, reaching from this framework to the floor, support and lift it up against the ceiling, driving wedges under the floor end of the supporting scantling, which will bring the ceiling in place and keep it there.

To prepare the nails: Put them in a vise. With a hack saw, saw slots in their heads like a screw (only slightly, but so that a sharp screwdriver will hold in the groove), then with the screwdriver turn the nail to the right and then to the left, gently pushing it, first through the plastering, then into the lath above, still pushing and gently turning. The head of the nail can be screwed into the plaster flush, so as to make a neat job, and hardly be noticeable on the floor beneath. The nails hold very firmly. Once in every 6, 8, or 10 inches square for a nail is usually sufficient. If the plaster is very porous and shaky, small copper washers may be used on the nails, but it must be very far gone to need them. Driving nails in with a hammer would destroy the whole fabric. Take down your lath framework, and there you have your piece of ceiling as firm and nice as ever it was. JOHN A. WHIPPLE.

40 State Street, Boston.

THE retail price of beef in New York is, in general, close on to 100 per cent more than the wholesale price. A carcass of beef sells at wholesale for \$50 and at retail \$93.

MOVING OF A HOUSE THIRTEEN MILES BY WATER.

On pages 39 and 47 we illustrate from photographs, taken expressly for the SCIENTIFIC AMERICAN, the moving of the frame house of Mr. Minot Blakeman, from Wheeler's Mills, on the Housatonic River, above Stratford, Conn., to West Stratford, Conn., a distance of about thirteen miles, by water. The building measures 48 x 41 feet over all, is estimated to weigh about 100 tons, and has three chimneys. It originally stood on a hill about 400 feet back from the river, and 80 feet above the same, near a winding road, as will be seen in the illustration entitled "Original Location." From the piazza a commanding view of the broad expanse of the river was to be had, overlooking the foliage along the bank.

The house was moved northerly about 1,000 feet down the gradual slope of the hill, until it reached the abrupt bank rising almost vertically thirty feet above the river. Here it was necessary to cut away trees and to dig trenches in the ground in order that the rear of the main supporting beams might be more easily lowered when the front blocking was taken out. One of our views shows the house as it appeared from the river prior to being lowered by jack screws, which required

arrived at Stratford Point, and about 8:30 A. M., the tugs, with their floating building, steamed into Bridgeport harbor. At next tide scows were floated into position. Beams were quickly laid between the bank and scows, a windlass set up, and, before the tide fell, the building was safely hauled ashore, and afterward moved in the ordinary manner about a quarter of a mile to its final location, in West Stratford, Conn., where it now stands, completed, as shown in our center picture.

The name of the mover and engineer is Mr. Burr Curtis, a resident of Bridgeport. So successfully was the work done, that the owner, Mr. Blakeman, states not a timber or door in the building was sprung, not a bit of plaster fell, not a break or crack occurred in any of the three chimneys, and only eight dollars was expended in mason work, that would have been done if the house had not been moved.

The original valuation of the house was \$5,000, and the expense of moving came within \$1,200.

A VILLA NEAR NEW YORK.

We give on page 41 an engraving of a villa at Flatbush, Long Island. The engraving was prepared

Bath room is wainscoted.

The walls are plastered and corniced.

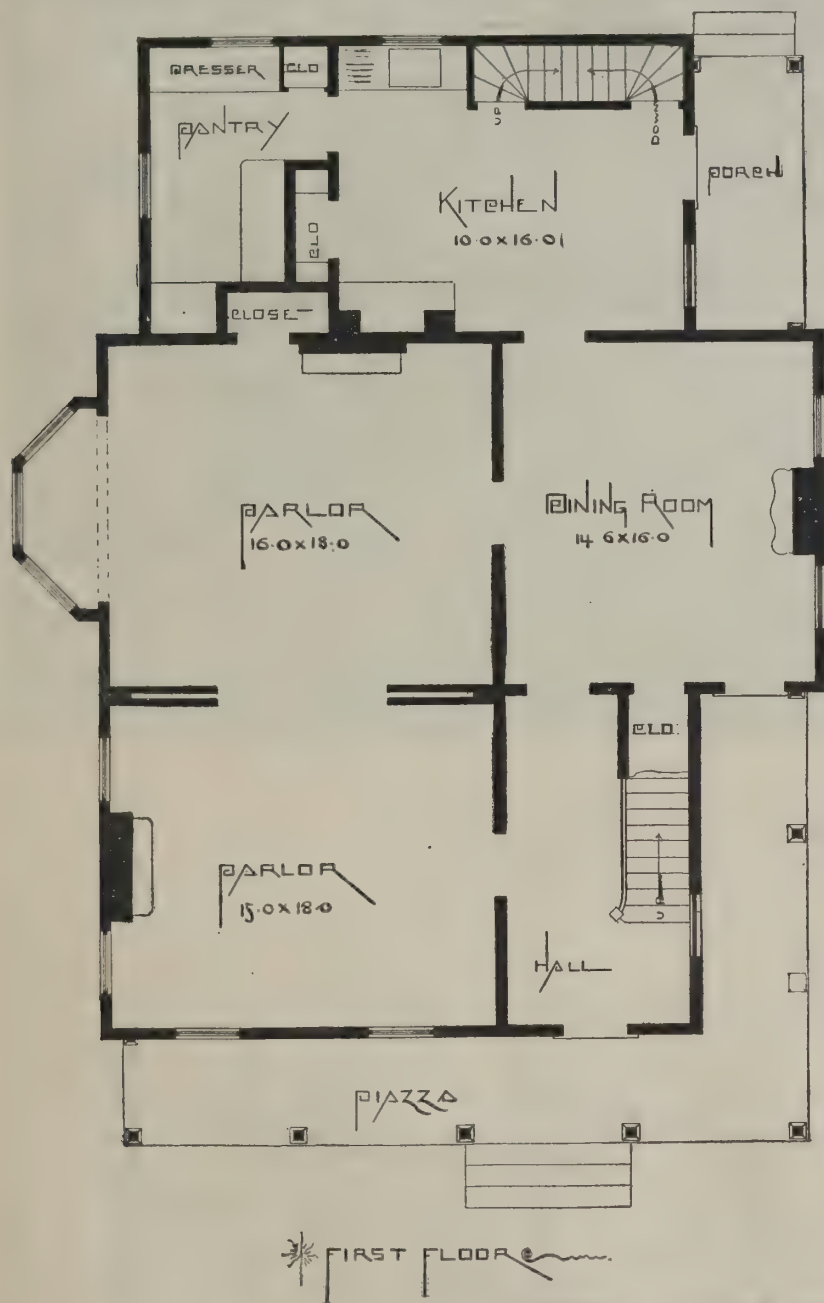
All the windows are glazed with plate glass, and are provided with English Venetian blinds. Cost, \$8,000.

"Imitation is the Sincerest Flattery."

Under this pleasing heading, but with many ill natured words, our excellent cotemporary, *Building*, calls attention to the colored plate in our February number entitled "A Country Dwelling," the original sketches for which, by Messrs Walgrove & Israel, architects, of this city, were first given in *Building*, but, by an inadvertence on our part, the due credits were not given by us at the time of publication. This we sincerely regret, and shall try to take care it does not occur again.

A Strong Company.

Gains everywhere! That is about the best epitome of the New York Life Insurance Company's annual report for 1888, which will be found in our advertising columns. Income, twenty-five million dol-



MOVING A HOUSE THIRTEEN MILES BY WATER.

several days. After lowering, it was moved out over blocking built on a soft bottom, to the piles, on which rested heavy timbers. One view shows the house on the way, and the other after it has been finally moved over the piles.

At low water the heavy mud scows observed on each side of the house were floated under it between the rows of piles, then, as the tide rose, they cleared the house from its support in about half an hour after they came in contact. This took place at about 5:30 A. M., on August 29, 1888, at flood tide, and the building, thus floating, together with the blocking, which had previously been thrown in the scows, was successfully towed down the river against the tide by two steam tugs, passing through two drawbridges, as shown in the view entitled "Passing through Washington Bridge." The owner and his family were in the house, and enjoyed their breakfast while floating down the river, the smoke from the fire in the kitchen issuing as lazily from the chimney as if the building was on terra firma.

The novelty of the undertaking attracted many sight-seers along the banks of the river, and cheers went up as the house passed along. The weather was remarkably favorable, not a breath of wind stirring. In this way the house sailed down through the mouth of the Housatonic River, out upon Long Island Sound, and

direct from a photograph of the building, made especially for the SCIENTIFIC AMERICAN.

The exterior appearance of this house is very pleasing. The side and rear elevations, not shown here, are quite as pleasing as the front.

The floor plans are arranged to conform with the lines of both streets, as the house is built on a corner, and this will account for the peculiar shape of the hall, the other rooms being square.

The style of architecture is Queen Anne. The piazza is low and broad, so that it will be shady. The circular bays or projections on the corner of sitting room run up two stories and rise into a tower, which finishes in a lookout.

The foundation wall is of cut bluestone.

The exterior, from top of underpinning to the highest peak in roof, is covered with shingles throughout.

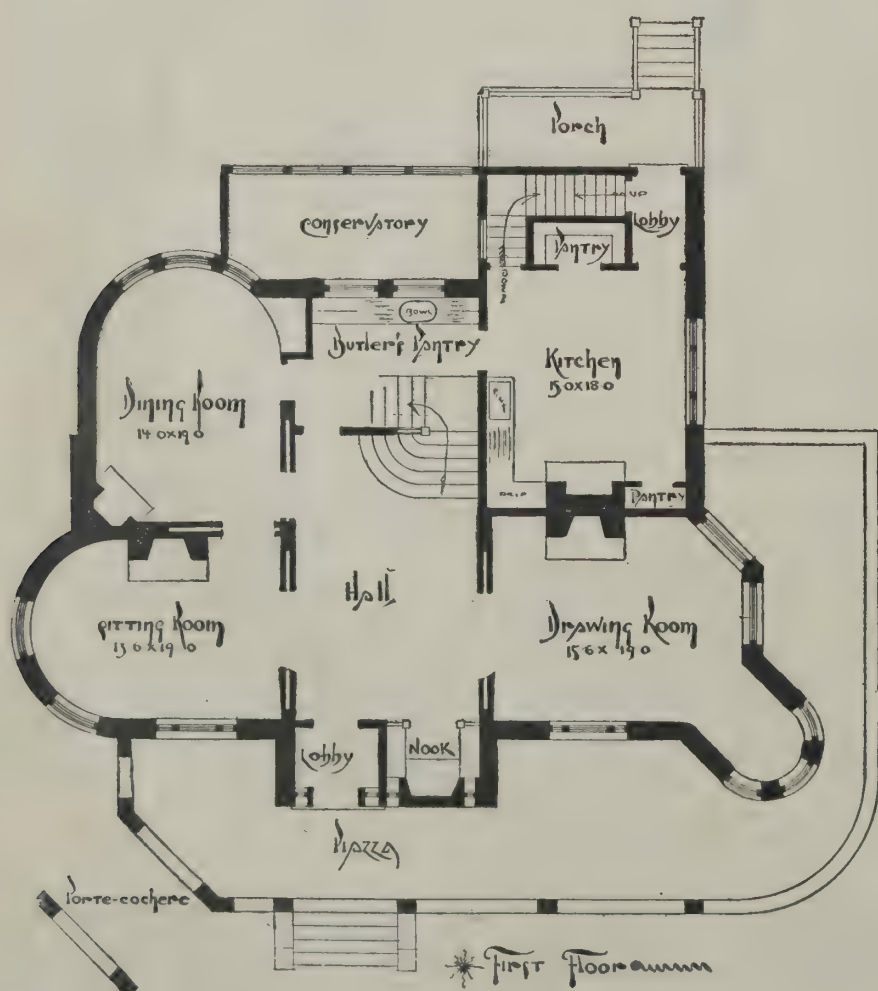
There is cemented cellar under the house, and contains laundry and furnace rooms.

Three rooms are finished off in attic, besides a trunk room.

The trim throughout is of cherry. The principal rooms have open fireplaces, tile hearths, and hardwood mantels. The sitting room and parlor have closets well fitted up. The dining room has a china cabinet in corner. The front hall staircase leads to attic.

lars—a gain of three millions; payments to policy-holders, over ten million dollars—a gain of over a million; assets, over ninety-three million dollars—a gain of ten millions; surplus, over thirteen million dollars—a gain of over a million and a half; insurance written, one hundred and twenty-five million dollars—a gain of about twenty millions; insurance in force, over four hundred and nineteen million dollars—a gain of over sixty millions. The admirable contracts it offers, and the superior results of its matured policies, have made it a favorite company with the insuring public.

If any of our readers have made an invention for which they have thoughts of taking a patent, they are invited to communicate with Messrs. Munn & Co., the publishers of this paper, who for a period of forty-three years have conducted a most successful bureau in this line. A pamphlet of instructions will be sent free, containing full directions how to obtain a patent, costs, etc. In very many cases, owing to their long experience, they can tell at once whether a patent probably can be obtained; and advice of this kind they are always happy to furnish free of charge. Address Munn & Co., SCIENTIFIC AMERICAN office, New York.



A SUBURBAN RESIDENCE.

[For description see page 53.]





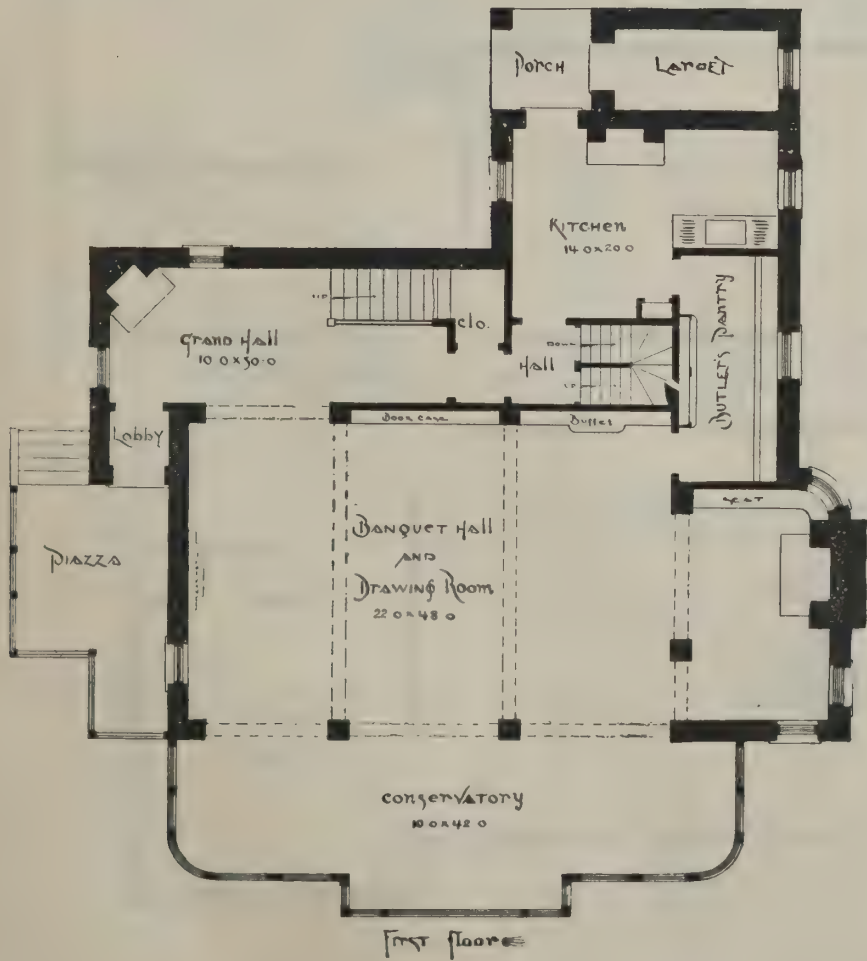
A VILLA NEAR NEW YORK.
[For description see page 39.]





First Floor — Queen Anne Cottage — Cost \$3500.
A QUEEN ANNE COTTAGE FOR \$3,500.
[For description see page 53.]

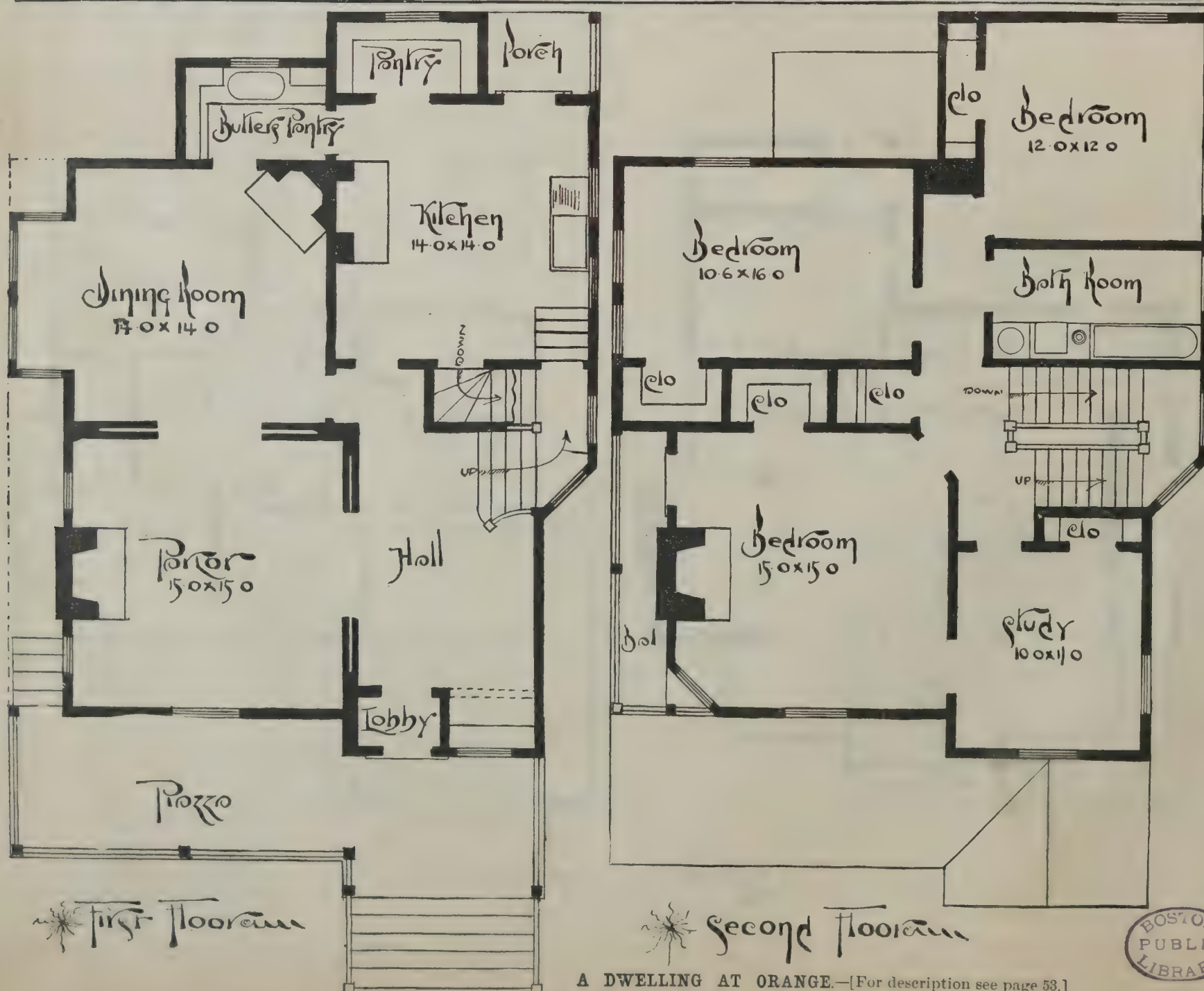
Second Floor



A RESIDENCE AT RICHMOND HILL.

[For description see page 53.]



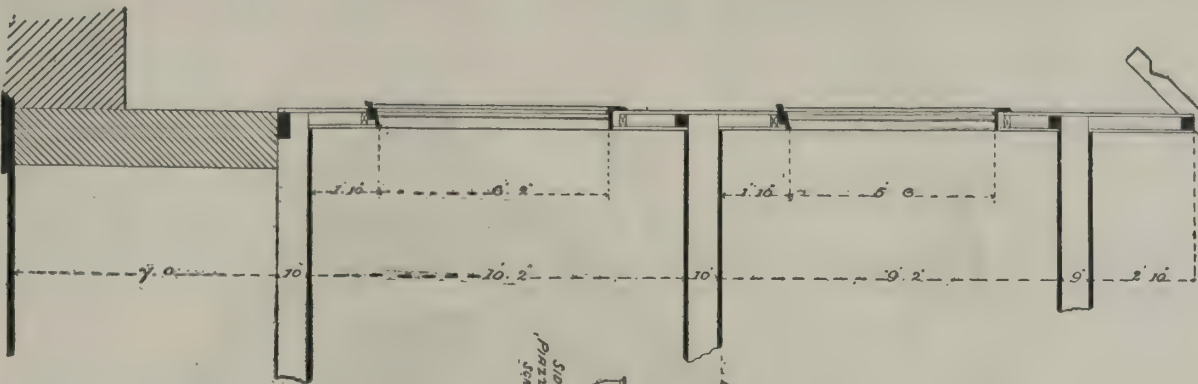


A DWELLING AT ORANGE.—[For description see page 53.]

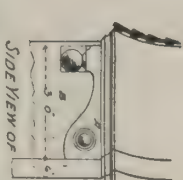


A HOUSE FOR \$5000.

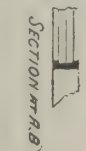
SECTION THIRD BUILDING. SCALE A.



SIDE VIEW OF BRACKET AT BAY. SCALE A.



SECTION AT A, B.



SECTION AT C, D.



SECTION AT A, B.

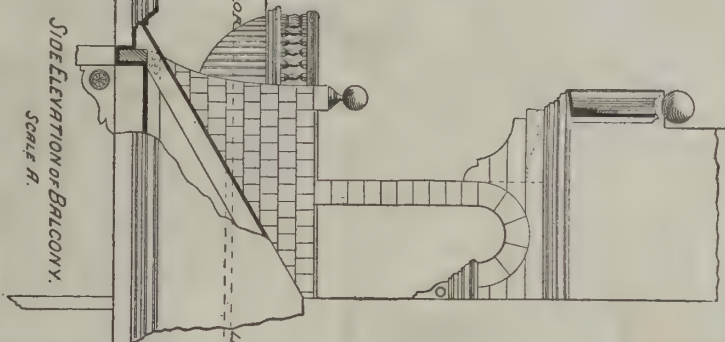


SECTIONS OF STAIR BALUSTERS.

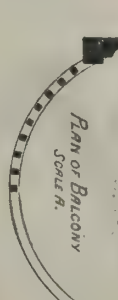
SCALE B.



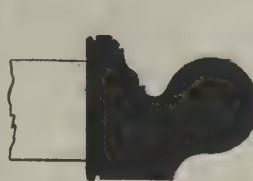
SIDE ELEVATION OF BALCONY. SCALE A.



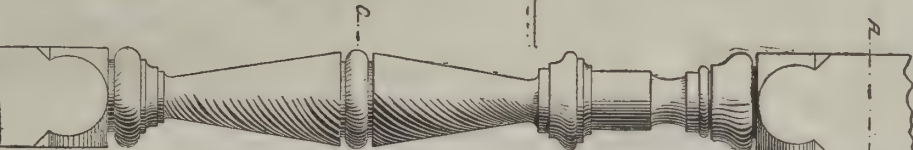
FRONT ELEVATION OF PIAZZA, BALCONY, ETC. SCALE A.



STAIR HANDRAIL. SCALE B.



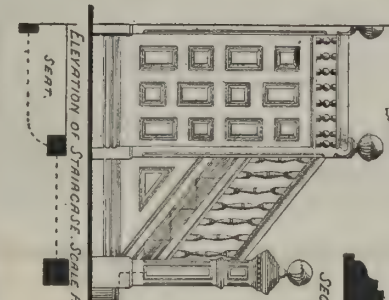
STAIR BALUSTER. SCALE B.



SECTION OF STAIR STRING. SCALE B.



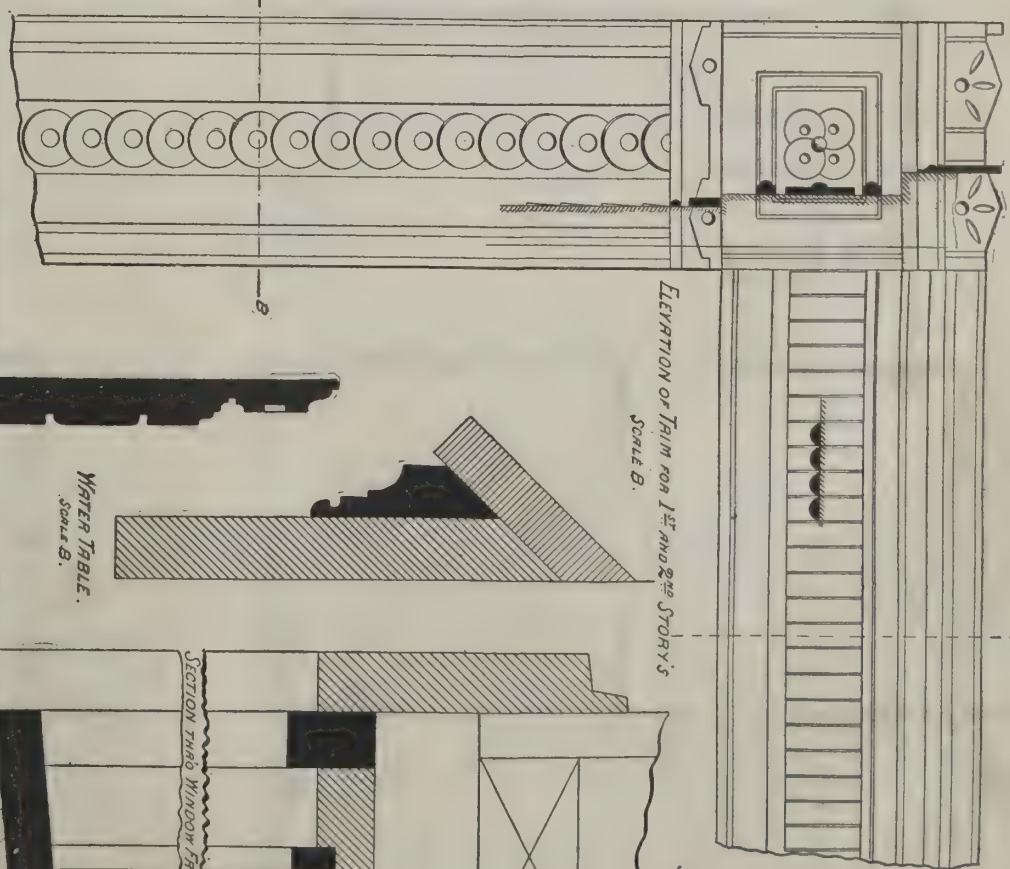
ELEVATION OF STAIRCASE. SCALE A.



BASE MOLDING. SCALE B.



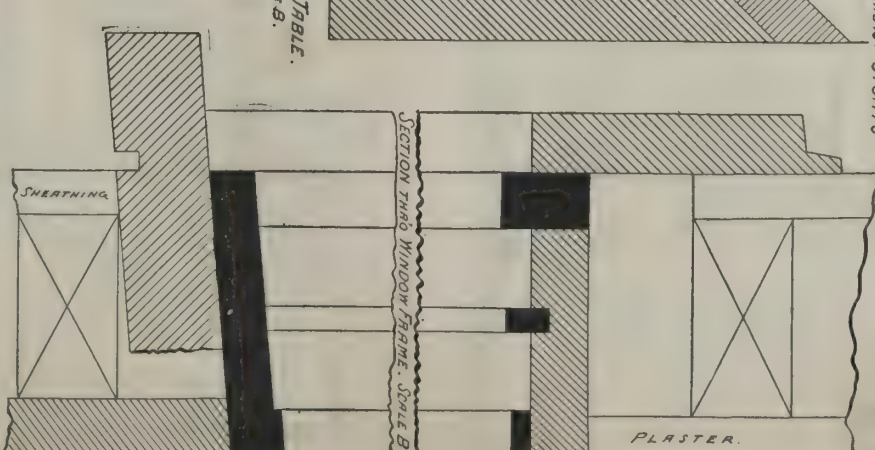
ELEVATION OF TRIM FOR 1ST AND 2ND STORY'S. SCALE B.



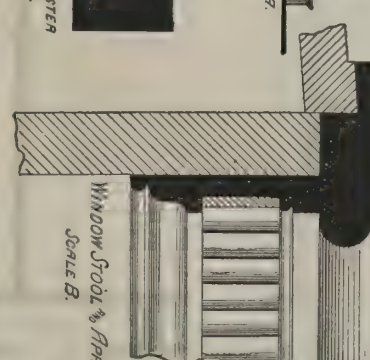
WATER TABLE. SCALE B.



SECTION THIRD WINDOW FRAME. SCALE B.



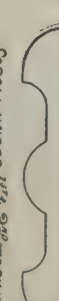
WINDOW STOOL & APRON. SCALE B.



SCROLL UNDER ATTIC WINDOW. SCALE C.



SCROLL UNDER 1ST & 2ND STORY WINDOWS. SCALE C.



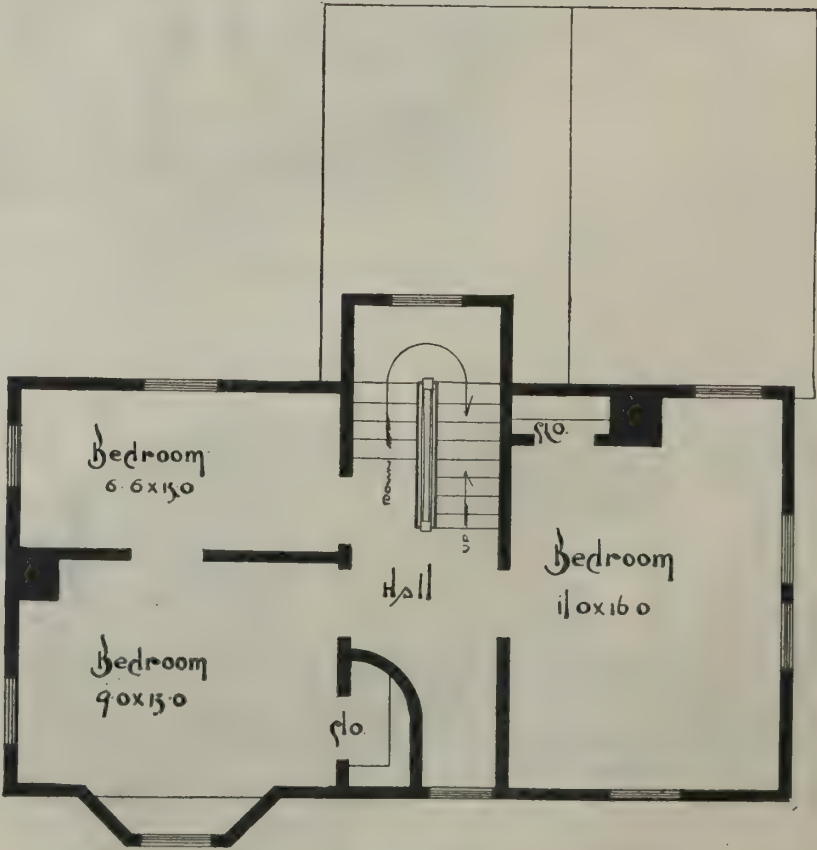


A RESIDENCE AT BRIDGEPORT, CONN.—[For description see page 58.]



MOVING A HOUSE THIRTEEN MILES BY WATER.

[For description see page 39.]



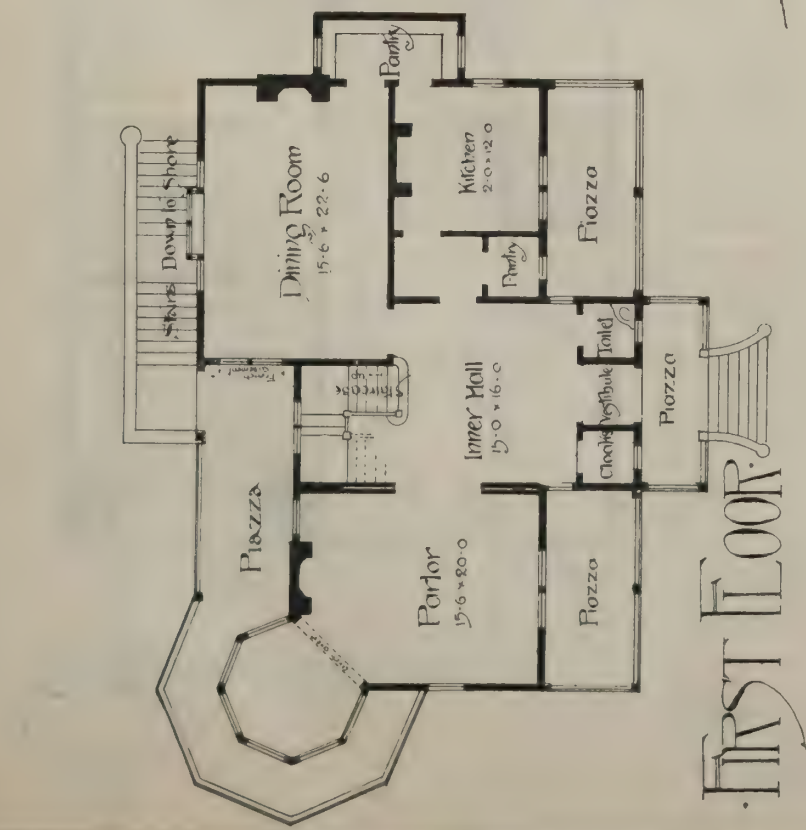
* First Floor

* Second Floor

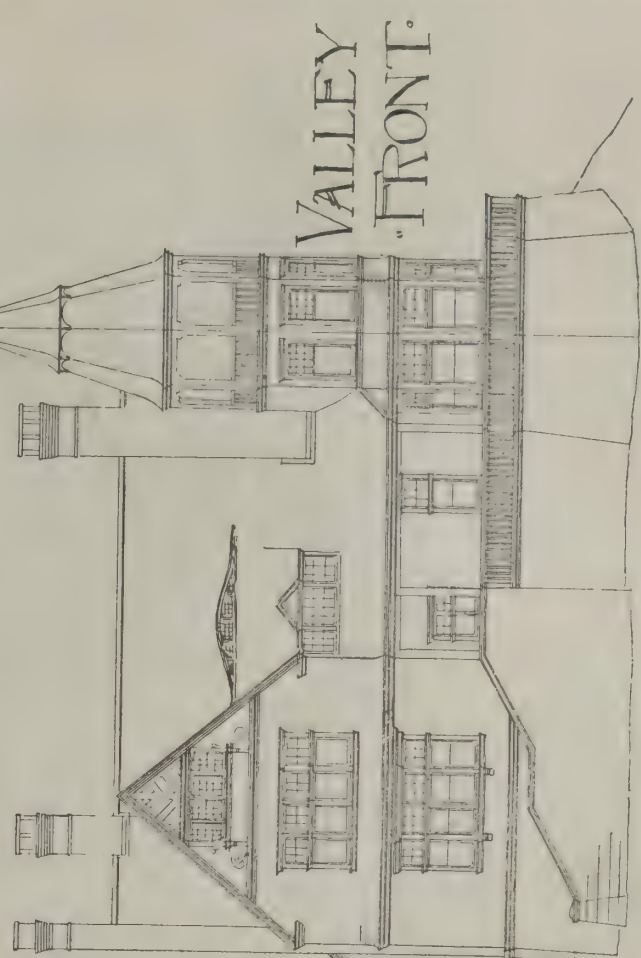
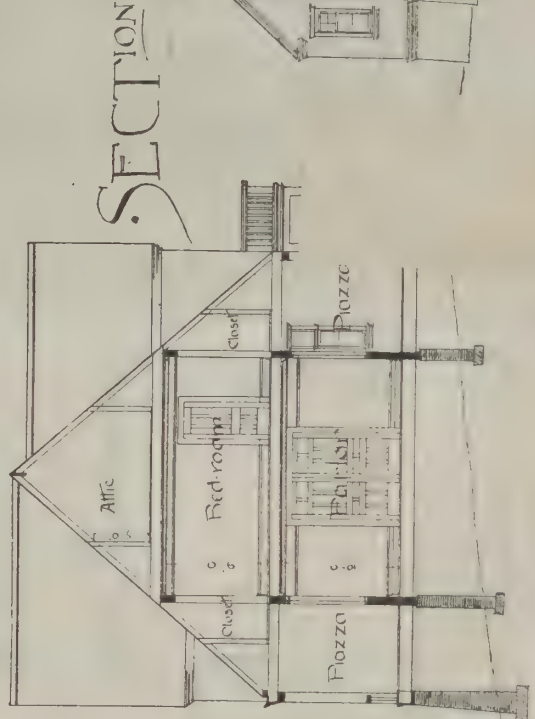
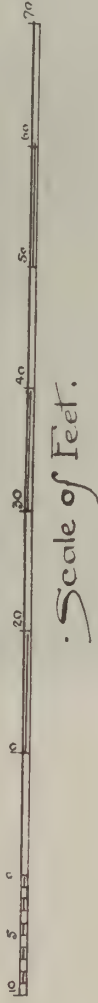
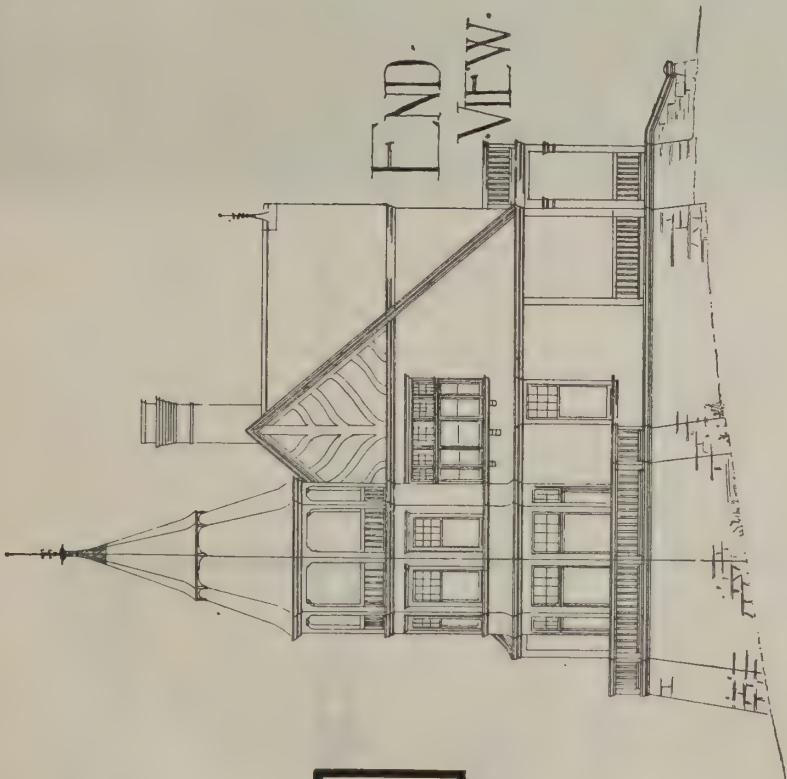
A HOUSE FOR EIGHTEEN HUNDRED DOLLARS.

[For description see page 51.]

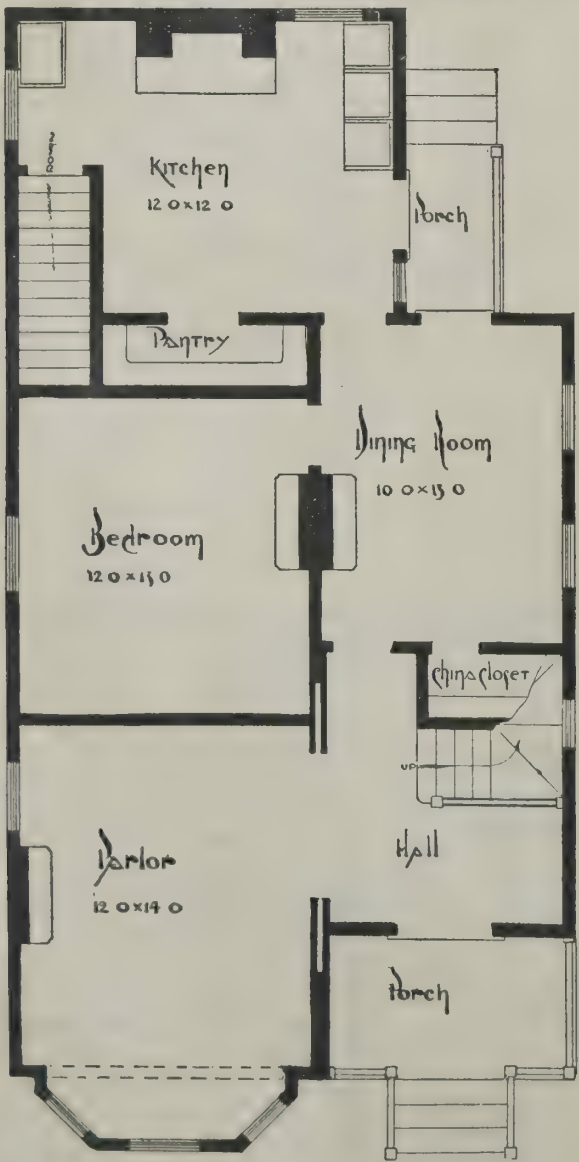




ACOTTAGE.
FOR \$3000.



SECOND FLOOR.



* First Floor



* Second Floor

A COTTAGE FOR \$2,100.

[For description see page 53.]



A COTTAGE FOR \$2,300.

The engraving and plans on this page illustrate a \$2,300 cottage at Rutherford, N. J.

It has a pleasing effect, and the arrangement of rooms is good.

There is a cellar under whole of the house, with cement floor, containing a laundry, furnished with wash trays, etc. This cellar has a foundation of stone, underpinning of brick.

First story clapboarded, second story shingled, roof slated.

The trim throughout is of white pine, part of which is finished in cherry, and the rest in the natural.

The house is well provided with closets and pantries, fitted complete.

One bed room finished off in attic, and ample storage room.

Our engraving is made direct from a photograph of the house, taken especially for the SCIENTIFIC AMERICAN.

A HOUSE FOR \$1,800.

This is a recently built house, at Rutherford, N. J., at the low cost of \$1,800, complete. It is illustrated on page 48.

The elevations are quite pleasing.

There is a foundation



of stone, with an underpinning of brick. The frame is covered with matched sheathing and beveled clapboards of white pine, 6 in. wide. The roof is covered with octagonal cut slates.

There is a cemented cellar under whole of the house, with an outside entrance thereto.

The hall is 6 ft. wide, and runs through the house, with a porch at either end. This hall has stairs that lead to cellar and to second floor, with newels, posts, and balusters all neatly turned out of white pine.

The trim throughout is of white pine, stained cherry.

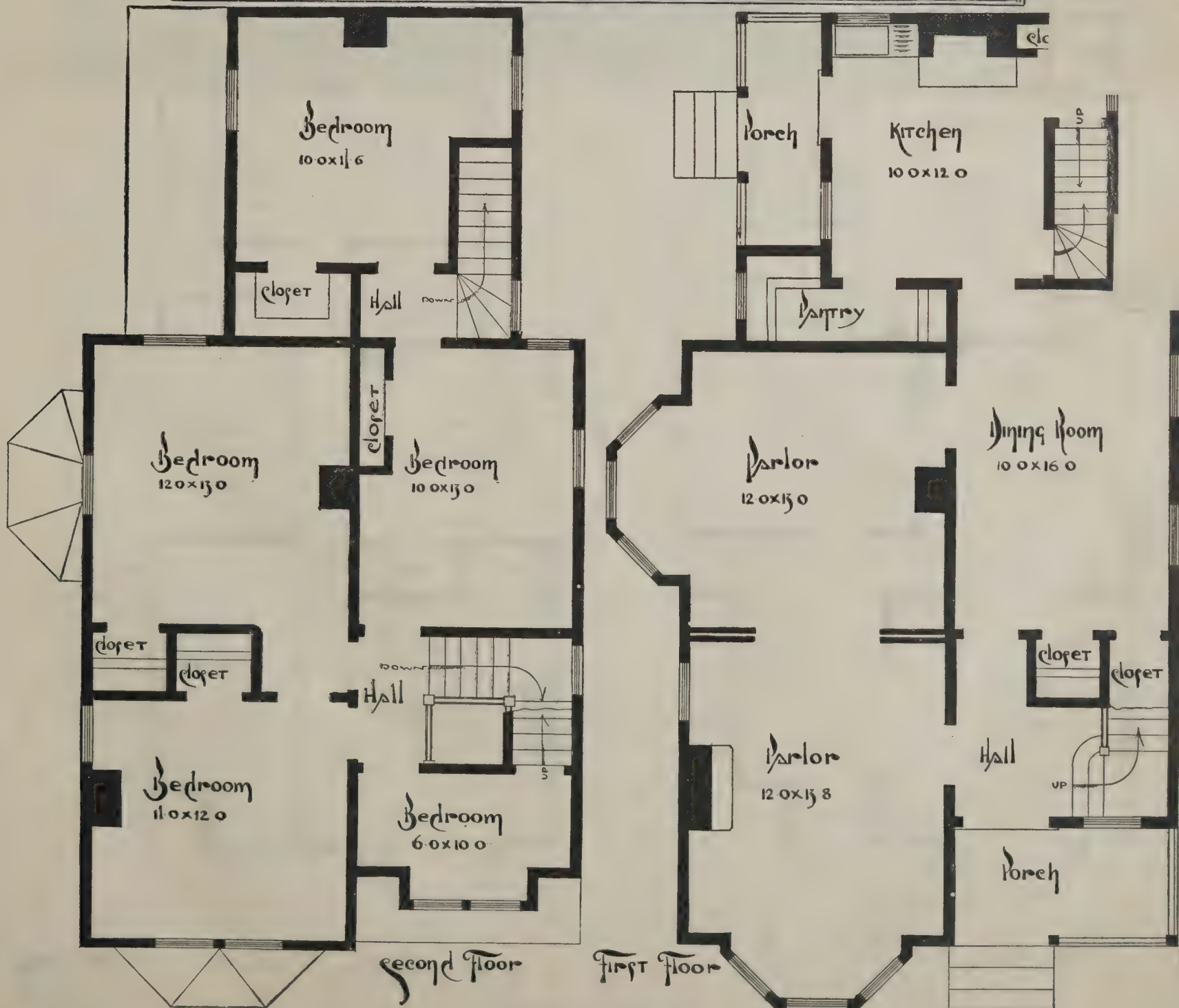
The dining room has a china closet, with shelves, etc. The kitchen is neatly wainscoted.

There are three good sized bedrooms on second floor, with closets.

There is a window seat in bay window of front room.

Ample storage room in attic.

A CEMENT to make joints for granite monuments: Use clean sand 20 parts; litharge 2 parts; quicklime 1 part; and linseed oil, sufficient to form a thin paste.



A COTTAGE FOR \$2,300.



A RESIDENCE FOR \$5,000.





A COTTAGE FOR THREE THOUSAND DOLLARS.

BOSTON
PUBLIC
LIBRARY



A DWELLING FOR FIVE THOUSAND DOLLARS.



A RESIDENCE FOR \$5,000.

This house, shown on page 52, has lately been erected at Rutherford, N. J., at a cost of \$5,100, the result being the production of a residence essentially comfortable and convenient.

Foundation of stone. Underpinning of cut brown-stone, laid in red mortar. There is cellar under whole of house, cemented, with laundry, etc., complete. The exterior is covered with clapboarding and shingles. The roof is covered with octagonal cut slates.

The rooms are well arranged, which is shown by the floor plans. Newels, posts, balusters, and rail are turned cherry.

The trim throughout is of cherry. Sliding doors are provided. Open fireplaces with tiled hearths and hardwood mantels.

The kitchen is wainscoted. The sink is cased up, with a closet under. The china closet and pantry are fitted up with shelves, drawers, and cupboards, complete.

The bath room is wainscoted.

Two rooms are finished off in attic with closets, etc., besides ample storage room.

The house is piped for gas.

Our engraving is made direct from a photograph taken especially for the SCIENTIFIC AMERICAN.

A SUBURBAN RESIDENCE.

Our engraving on page 40 illustrates a beautiful residence lately built on Reynolds Terrace, Orange, N. J., from designs by Architect John E. Baker, Newark, N. J.

The house has a pleasing aspect.

There is a large and well-ventilated cellar under whole of the house, coal and wood bins, vegetable cellar, laundry, and furnace rooms.

The foundation wall is laid with stone, and the underpinning of the first story and balustrade to piazza is built of bluestone, laid at random, with door and window jambs of brick. The second story is covered with cut shingles, and the roof with octagonal cut slates.

On the first floor the lobby has a floor of tiles wainscoted four feet up, laid in panels, and at side of this lobby there is a nook separated from hall by an arch, filled in with spindle work. This nook is furnished with seats and open fireplace with tiled hearth, and a bric-a-brac mantel. The hall proper is finished throughout in oak, beaded and moulded; the ceiling is finished in beaded panels. The staircase, newels, posts, balusters, and rail are carved and turned.

The drawing room is finished in oak, and is a well-lighted and cheerful room, with open fireplace, tiled hearth, and a mantel with plate glass mirror, etc.

The sitting room is finished and ceiled in ash.

The dining room is finished similar to sitting room, and is wainscoted with narrow beaded ash, laid in panels.

A prominent feature is the conservatory that opens from dining room.

The floors of first story are laid in oak and cherry, and the principal rooms have sliding doors. The butler's pantry is fitted up with shelves, drawers, and cupboards, also a butler's bowl, cased up with closets under.

The kitchen is wainscoted with narrow beaded stuff, open fireplace, with a range, and sink, also pantries, with shelves complete. Stairs lead to cellar and to second floor.

The rooms on second floor are finished in cherry, ash, and white pine in the natural.

There are five large and well-lighted bedrooms in attic, with closets.

Speaking tubes, electric bells, gas, and chandeliers are provided.

Cost, about \$12,000.

Our engraving was made direct from a photograph of the building taken especially for the SCIENTIFIC AMERICAN.

QUEEN ANNE COTTAGE FOR \$3,500.

Our engraving on page 42 illustrates a Queen Anne cottage which has been erected on the terrace at Richmond Hill, N. Y., at a cost of \$3,500 complete.

It is an attractive elevation and a well arranged plan.

The foundations are of stone, with underpinning of local brick.

The casings and trim internally are all of whitewood, and are neatly beaded and band moulded, with corner blocks at angles.

Whitewood is employed in wainscoting kitchen, pantry, and bath room.

There is a side entrance, with a *porte cochere*, and a porch at the front.

The parlor and dining room have open fireplaces, with tile hearths and hardwood mantels. There are two small bay windows.

The china closet is neatly fitted up.

The kitchen is provided with sink, cased up, with closet under.

The pantry is fitted up with drawers and shelves.

The large pantry is fitted up with shelves for stores, and has an entrance to cellar.

A servants' bed room is off kitchen.

A summer kitchen is provided in cellar, 14 x 20, fitted up with sink, pantry, wash trays, etc.

The rest of the cellar is fitted with coal and wood bins, and a furnace room, with heater.

An easy staircase leads from front entrance hall to second floor.

Three good sized bed rooms are on this floor, with ample closet room.

The front bed room has an open fireplace, with tile hearth, and neat wood mantel and a dressing room.

A staircase leads to attic, which is used only as a storage room.

The house is piped for gas.

The ceilings are neatly corniced and have center pieces.

Our engraving was prepared from a photograph taken direct from the building.

A RESIDENCE AT RICHMOND HILL.

This beautiful "Old English" house, of which we give a perspective and floor plans on page 43, has lately been erected at Richmond Hill, N. Y.

This house is understood to be one of the most costly on Long Island.

The style of architecture is "Old English," and is fully carried out.

The foundation is of the best quality of building stone, while the underpinning and first story are of cut bluestone.

The second story and attic is of wood, and is covered with the best quality of white pine shingles.

The exterior is painted in a shade of dark yellow, and harmonizes with the soft gray color of the stone work.

The roof is painted in tile red.

The interior is finished in an elaborate manner.

All the woodwork throughout on the first floor, except kitchen, pantries, etc., is of solid mahogany.

The lobby is neatly paneled in mahogany, and is finished with a heavy moulded cornice.

The reception hall is spacious, and contains two large windows and a terra cotta fireplace and hearth, and an artistic mantel with plate glass mirror.

The staircase leading to second floor is of handsome design, and has newels, posts, rail, and spindle balusters, carved, turned, and twisted.

There is a coat and hat closet under front stairs.

The floor in this hall, as well as in the banquet hall, is laid in hardwood, in narrow widths, and polished.

The banquet hall, 22 x 48 ft. long, can be used as a dining room and drawing room combined.

There are no doors, except to pantry, from this room. Pilasters are placed every twelve feet apart. The dotted lines show the floor beams dropping below the ceiling.

Between these beams the ceiling is plastered with mortar. Small cobble stones and gravel are inserted at random, and left to protrude. The ceiling is then bronzed.

The pilasters are neatly cased up, and have carved caps.

The sides are wainscoted six feet high.

In the hall is a cabinet, a book case, and a sideboard or buffet.

Part of the hall is used for a dining room, which can be separated by two large Japanese screens. At the rear of this hall is a large open fireplace, which will admit four-foot logs.

There is a hearth laid in brick tile, and carved mantel, with plate glass mirror, etc.

A conservatory runs the full length of this hall on the right hand side, and a running fountain plays therein.

The floor is laid of slate, cut octagonal, about 8 in. by 8 in. A portion of the conservatory is used as a sitting room, and hammocks are swung here and there.

To the rear of dining room is butler's pantry and kitchen, with fireplace and range, a porcelain sink, etc. There is also a large store room fitted up with ice chest.

Stairs lead to cellar and second floor from lobby at rear of main hall.

A dumb waiter connects breakfast room with kitchen.

The kitchen and its connections are fireproof. The floor is laid in slate.

On the second floor are four large bed rooms and breakfast room, besides a large hall and two bath rooms, with all porcelain fittings.

The woodwork of staircase and hall is of mahogany. The rest is of white pine, and each bed room is finished in a different style.

The front room is to be finished in gold and blue, the middle room in green, and the rear room in white and gold, while the front bed room is in terra cotta.

Two rooms are finished off in attic besides trunk room, and ample room for storage.

There is a cemented cellar under whole of house, which contains coal and wood cellars, and laundry, and a "Russian bath," fitted up in a very complete manner, and a servants' bath room.

Our engraving was prepared direct from a photograph of the dwelling, specially taken for the SCIENTIFIC AMERICAN.

A DWELLING AT ORANGE.

We present, on page 44, an engraving of a very attractive cottage recently built at East Orange, N. J.

The foundation is of stone, with an underpinning of brownstone, laid at random. The first story is clapboarded, second story shingled, roof slated.

There is a cemented cellar under whole of house, containing furnace and laundry.

On the first floor is a large and inviting hall, with lobby, and a nook with window seat, a staircase with newels, posts, and balusters turned, a parlor, and dining room, furnished with open fireplaces, tiled hearths and hardwood mantels, the former having two windows on either side of fireplace, of stained glass. The dining room is well lighted by a square bay window, and at the rear is a large butler's pantry, fitted up with butler's bowl, dressers, with shelves, drawers, and cupboards. The kitchen is wainscoted and has a fireplace, range, sink, etc. There is also a large pantry.

The inside trim throughout is of whitewood, finished in the natural.

There are three bedrooms on second floor, besides a study and bathroom, the former provided with closets, and the latter wainscoted.

There are rooms finished off in attic.

This house was erected at a cost of \$6,000.

Our engraving was prepared from a photograph of the building made specially for the SCIENTIFIC AMERICAN.

A RESIDENCE AT BRIDGEPORT, CONN.

We give a perspective and plan on page 46 of a cottage built on Colorado Avenue, Bridgeport, Conn.

The house is handsomely finished in the interior.

The cellar is 7 ft.; the first floor, 10 ft.; second floor, 9 ft. 6 in.

There is a cellar under whole house. Foundation stone, with an underpinning of palette brick.

The first story is covered with narrow beveled white pine clapboards.

Second story and gables are shingled.

The roof is also shingled and painted.

On the first floor there is a large hall, parlor, library, and kitchen, and back and front stairs leading to every room on the second floor.

The staircase bay window is an attractive feature.

The staircase has carved newels, balusters, and rail, all of whitewood.

All the principal rooms are connected with portieres.

A corner fireplace for the parlor and library, on first floor, and the guest chamber over parlor.

Hardwood mar

library, with a pl

style.

In the dining r

up in the usual w

There is a hat and coat closet under front stairs.

The kitchen is neatly wainscoted.

The bed rooms are all large, and have ample closet room.

A clothes chute is provided in bath room.

The door and window casings are all beaded and paneled.

The walls are neatly corniced, and ceilings have center pieces.

The house is piped for gas.

A portable furnace is provided in cellar.

The cost was \$4,400.

In the plans we have omitted the front piazza, which is 7 ft. wide, and also the rear porch and steps.

A COTTAGE FOR \$2,100.

This cottage, shown on page 50, has a foundation of stone, with underpinning of brick. All the work above is of wood.

The first story is covered with beveled white pine clapboarding, and second story with cut shingles. The roof is covered with cut slates.

A porch, with posts and balusters neatly turned, is at front. The hall has double entrance doors, glazed, and contains a staircase, with newels, posts, balusters, and rail, turned, of white pine, sliding doors to parlor, which has a pleasant bay window. The woodwork is of white pine, stained cherry.

The principal rooms have neat wood mantels.

The kitchen is wainscoted, and has an open fireplace, with slate hearth, and range, also sink and wash trays.

The pantry is neatly fitted up. Stairs lead to cellar, extending under whole house, and contains coal and wood bins, etc.

Rooms on second floor are amply provided with closets.

In the attic are two rooms, finished off, and storage room.

The engraving is made direct from a photograph of the house at Rutherford Park, N. J., taken especially for the SCIENTIFIC AMERICAN.

THE "WILLER" SLIDING BLINDS.

These blinds, manufactured by Mr. William Willer, of Milwaukee, Wis., have been in the market but a few years, but in that time have won for themselves an enviable reputation among architects and builders. One of the illustrations herewith represents the Willer exhibit at the Cincinnati exhibition last year, where it was awarded a medal. In another view is shown one way of arranging these blinds, as they are generally used on buildings of medium cost. This style consists of three separate sections of blinds, covering the entire window, and running in a guide-way containing three grooves, one for each section of blind, all within the space of the window opening,

"WILLER" SLIDING BLIND.

no pockets being employed at either the bottom or top of the window. These blinds have rolling slats of a novel construction and springs of peculiar form to hold

inches wide. The Egan Company were awarded medals of superiority for their machines at the Cincinnati Centennial Exposition.

AN IMPROVED REVERSIBLE RATCHET BRACE.

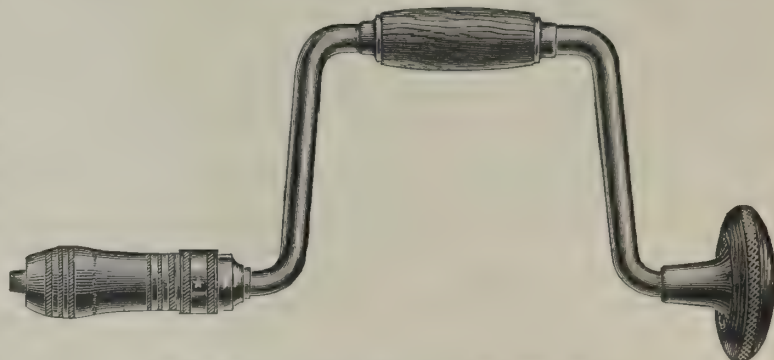
The accompanying illustration represents an improved reversible ratchet brace made by the American Bit Brace Company, manufacturers of fine tools and hardware specialties, Nos. 122, 124, and 126 Washington Street, Buffalo, N. Y., and patented by Mr. Johannes Th. Pedersen, of New York City. The socket is of such shape that the jaws of the tool-holding chuck, located within it, slide at once toward each other at the bottom, although a rib prevents their getting beyond their center, while a light spring keeps the jaws always open when the sleeve is unscrewed for the reception of bits. When any size or shape of shank of bit is put into the brace, the jaws slide back sufficiently to receive it, when, by screwing up the sleeve, the jaws press against the entire length of the shank, the pressure being more intense owing to the outer surface of the jaws being so rounded that they are forced down an inclined plane in the bottom of the socket. The ratchet mechanism is covered by a ring which operates the adjustment, and at the same time protects all the parts from dirt and dust. The pawls which work in the ratchet are made of steel drop forgings, and are held in place, over an essentially triangular-shaped bridge integral with the socket, by a tempered steel spring held in engagement with the inner wall of the ring, the ratchet itself being integral with the brace handle. This ratchet mechanism allows for freely operating the brace with either right or left hand motion, or for boring in corners where only a partial revolution can be obtained; it is said to be superior to anything else in the market, and its value is recognized by the trade everywhere.

The company also expect to be making, at an early day, another style of brace designed to quickly grasp either a bit or a twist drill, and securely hold it, without regard to the shape or size of the shank. By drawing down on the sleeve of the brace, the main jaws are forced upon auxiliary jaws, which open outward and engage their threads into the interior of the sleeve, when, by simply turning part of one revolution, the jaws are firmly held in place. The

jaws slide outward at bottom to receive any size, shape, or taper of shank, bit or drill, upon which they exert an even pressure from end to end, while with the screw-sleeve pinching at the top and the lower jaws at the bottom a great pressure is gained. The jaws are open continually for the reception of the tool when the sleeve is not screwed up. The company also contemplate making a full line of ratchet screwdrivers, hollow-handle tool sets, and hollow-handle screwdriver sets.

Canton, Ohio.

The Canton Manufacturing Co., of Canton, Ohio, is a new firm, being a consolidation of the Canton Well Driller Co. and E. W. Poorman & Co. The partners are T. C. Snyder and E. W. Poorman. They are now operating their new plant, just completed, which is fitted up throughout with best improved machinery. In addition to tools and supplies for sinking wells for water, gas, oil, and minerals, they will also manufac-



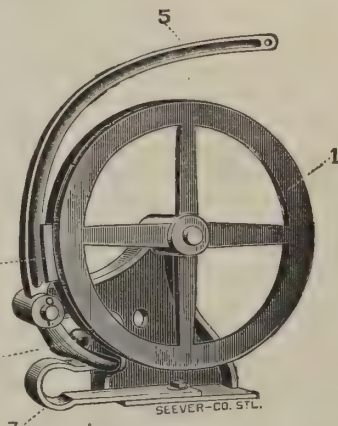
PEDERSEN'S REVERSIBLE RATCHET BRACE.

ture the improved steam and hot water boiler patented by E. W. Poorman, for heating dwellings, business houses, etc.

The Canton Steel Roofing Company, of Canton, Ohio, have brought suit against the Kanneberg Roofing Company in the United States Circuit Court for infringement of what is known as the H. W. Smith patent for sheet metal roofing, with L. L. Bond, of Chicago, Ill., Leggett & Leggett, of Cleveland, Ohio, and F. W. Bond, of Canton, as attorneys for complainant.

AN IMPROVED DUMB WAITER.

The illustration herewith represents the most important portions of a simple machine adapted for hoisting and lowering from the cellar, kitchen, dining room, etc., or for light work. The cage is balanced, and power so applied that it can be worked by a child. It can be worked from any floor, and when one stops pulling on the rope the cage is held firm by an automatic brake. The device can be applied to old dumb waiters without removing the outside casing. It is built by E. W. Moon, corner Tenth and St. Charles Streets, St. Louis, Mo.



MOON'S DUMB WAITER.

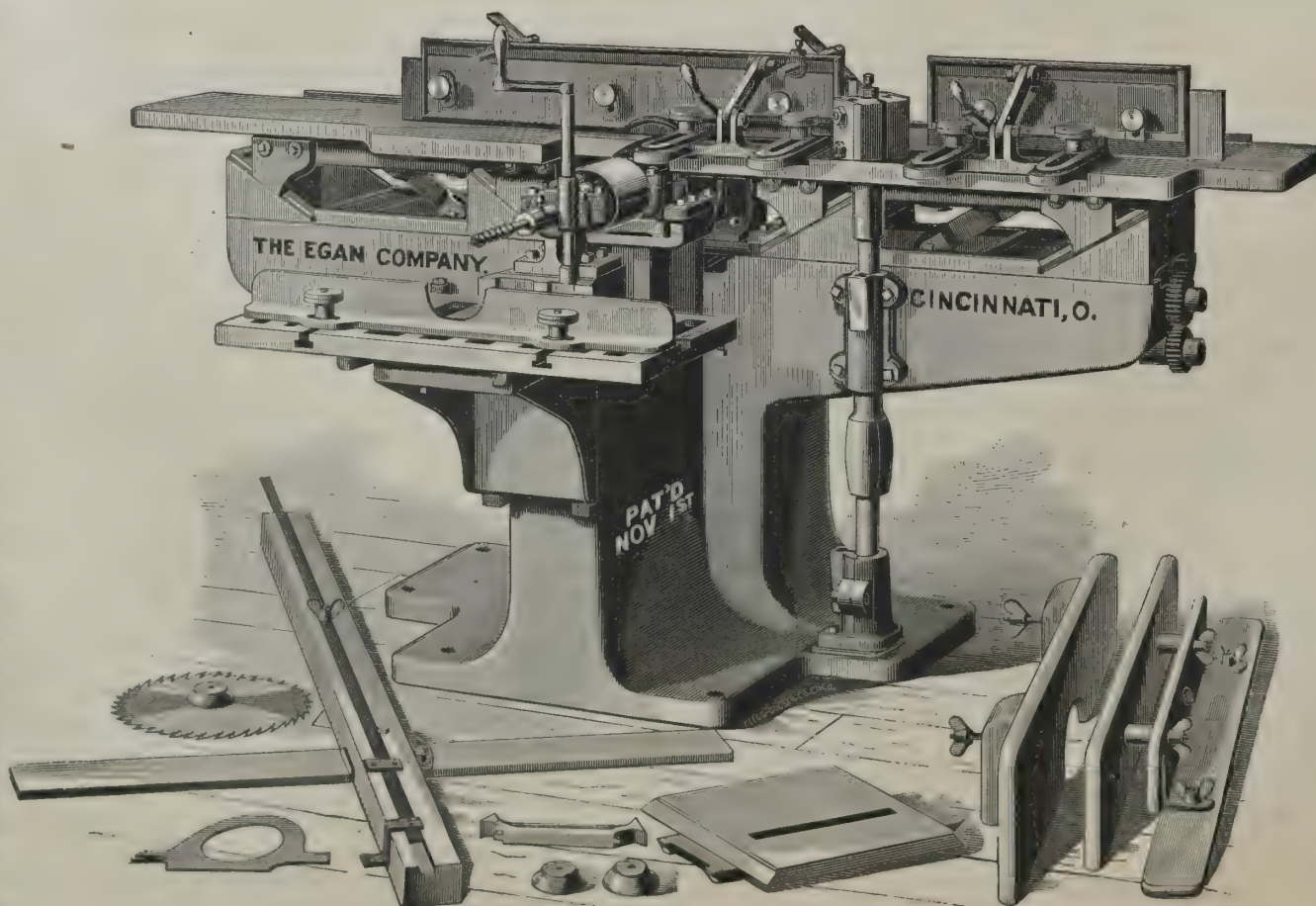
Water Pressure Regulators.

The H. Mueller Manufacturing Company, of Decatur, Ill., are the manufacturers of an improved water pressure regulator, and of water tapping machines, dry pipe tapping machines, corporation stop cocks, etc. By their pressure regulator they absolutely guarantee a uniform low pressure in the house supply pipes, regardless of high pressure in the mains. The regulator can be set at any pressure desired, say as low as fifteen pounds or upward, and is simple in construction, and not liable to get out of order.

A PROFESSIONAL friend who is always "up to something," says the *Ondontographic Journal*, has inlaid a table with human teeth—the accumulation of the extracting room for years. The grinding and polishing of the whole surface has brought out some unlooked for and novel effects.

IMPROVED WOODWORKING MACHINE.

The machine illustrated herewith, made by the Egan Company, of West Front Street, Cincinnati, Ohio, will do an immense variety of work, its builders claiming for it improvements and advantages possessed by no other machine, while it is exceedingly simple and easy of adjustment. The column is a cored casting, having a broad base, securing a good floor support. The portions which receive the working parts are planed true, so that when they are bolted in position there is no vibration whatever. The main mandrel is of the best cast steel, and runs in three long self-oiling boxes, lined with genuine babbitt. The pulley on mandrel is placed between two of the bearings, so that the mandrel will not get out of true. This mandrel is also fitted with patent adjustable bearings, by which the boxes and mandrel with head attached are moved back and forth across the machine, to suit the work desired. This is much better than moving the mandrel through a stationary box. The main head cuts 10 1/2



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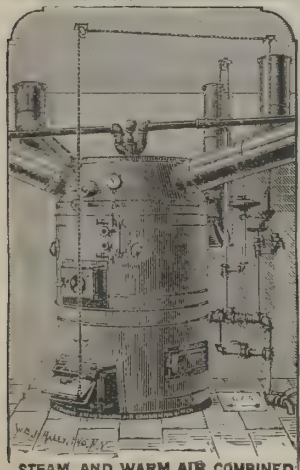
206 Water Street, New York.

75 Union Street, Boston.

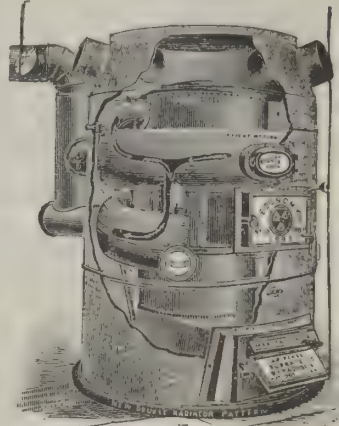
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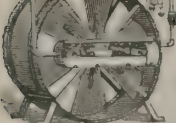
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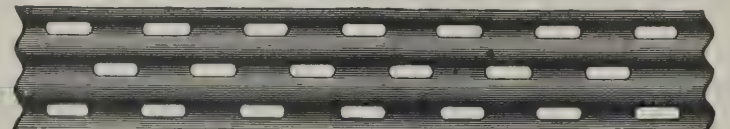
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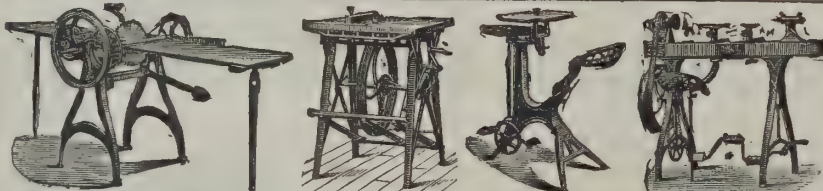
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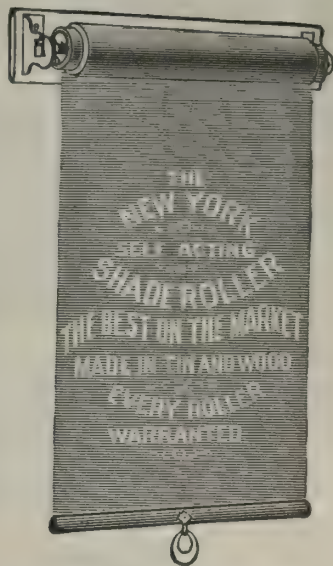
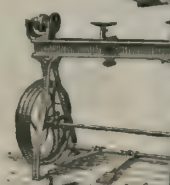
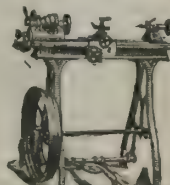
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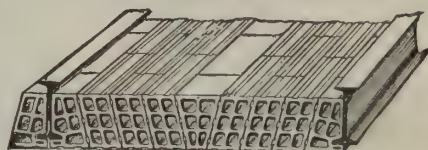
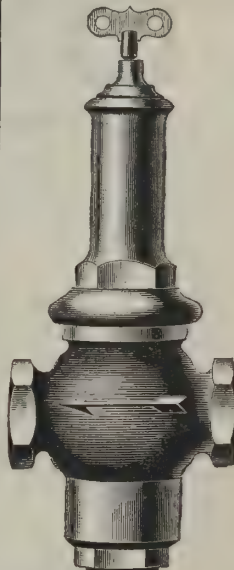
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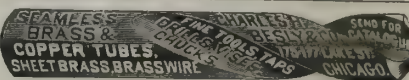
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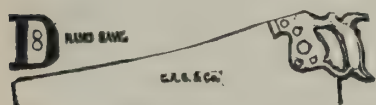
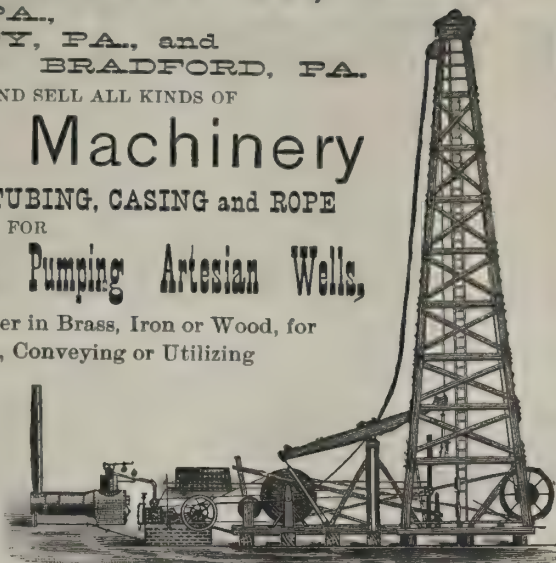
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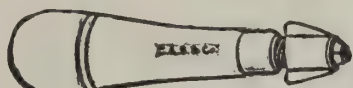
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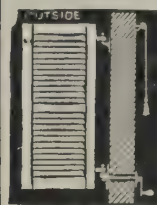
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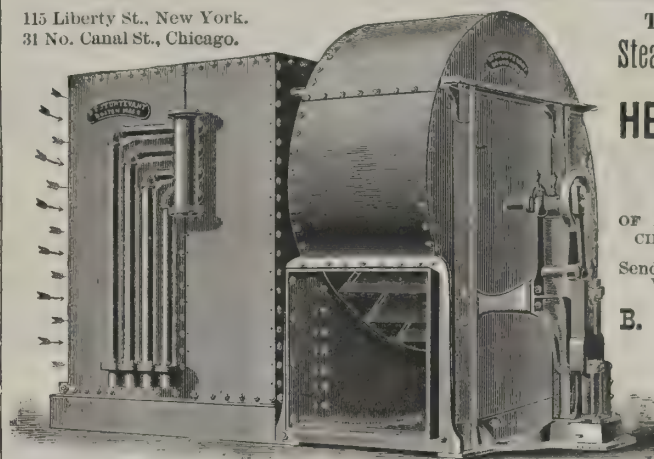
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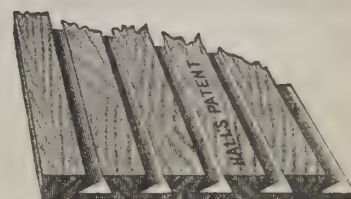
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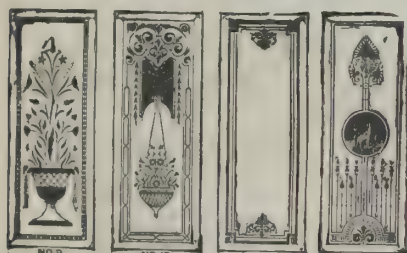
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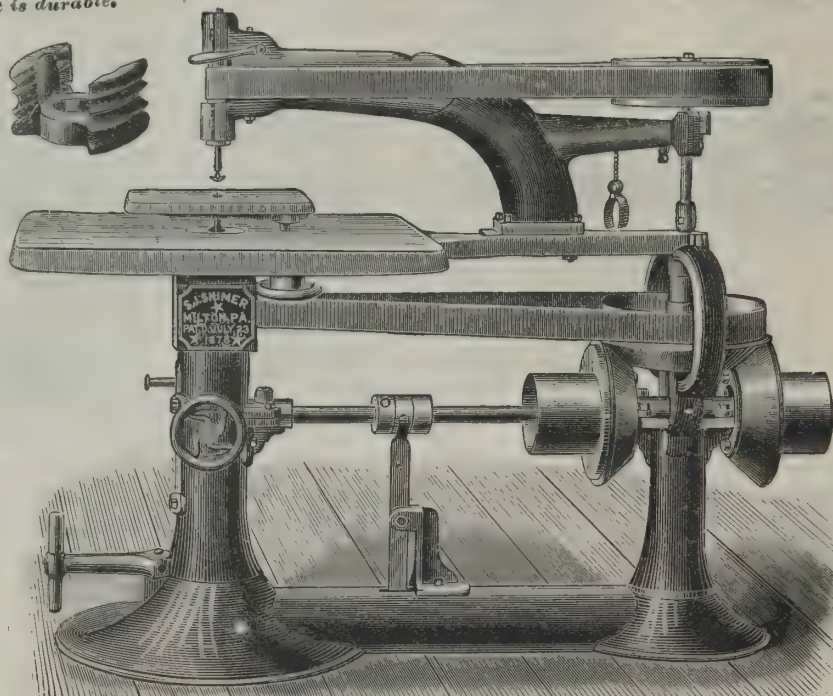
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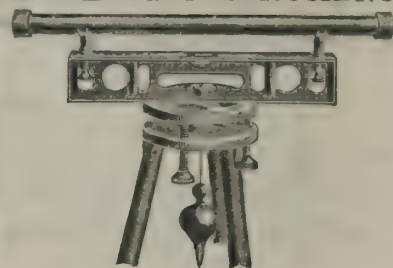
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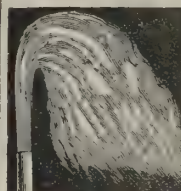
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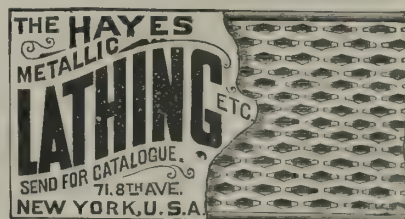
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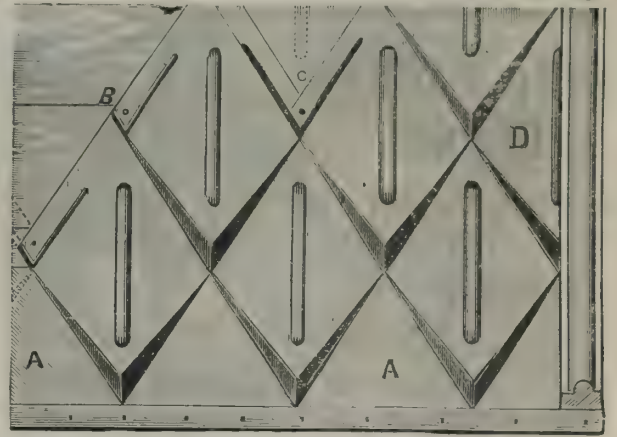
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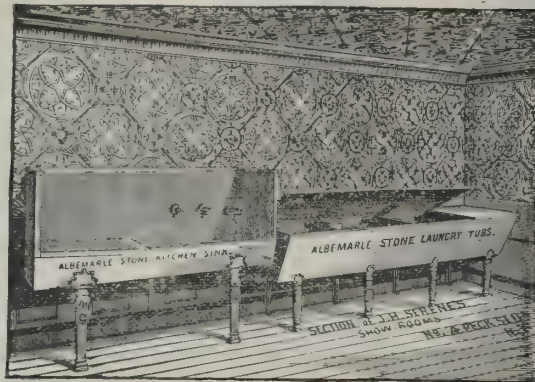
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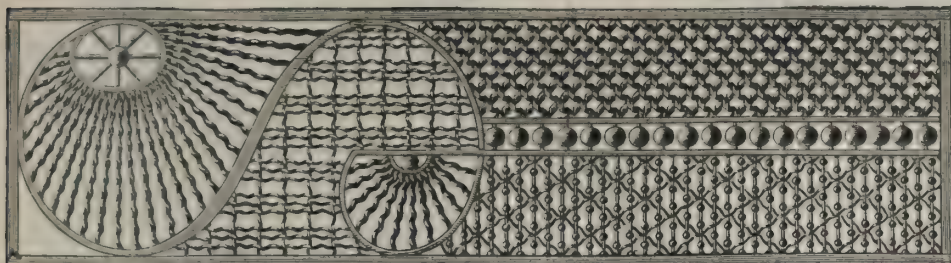
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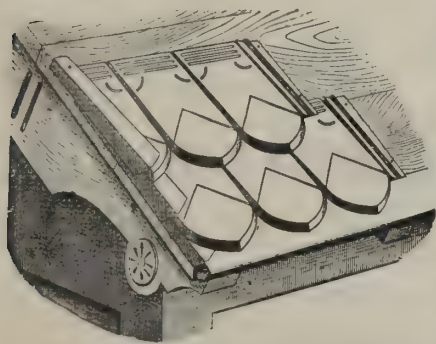
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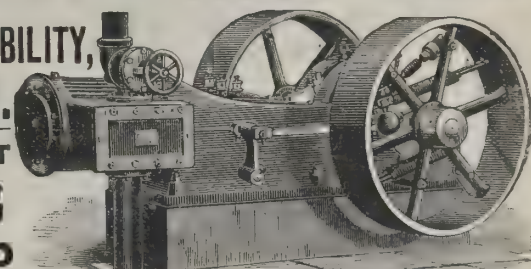
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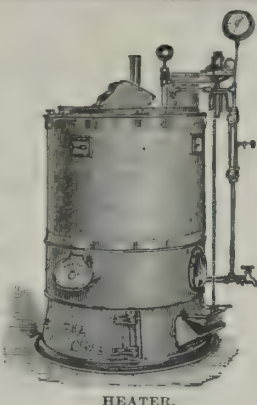
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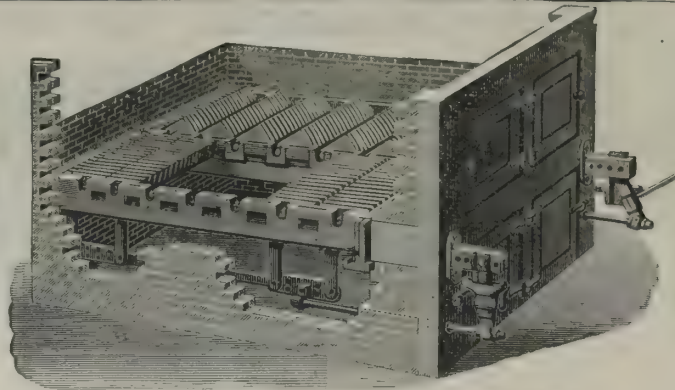
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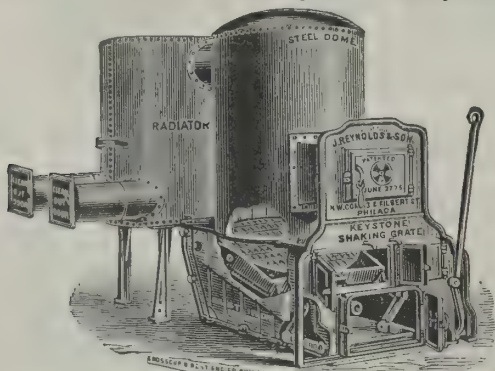


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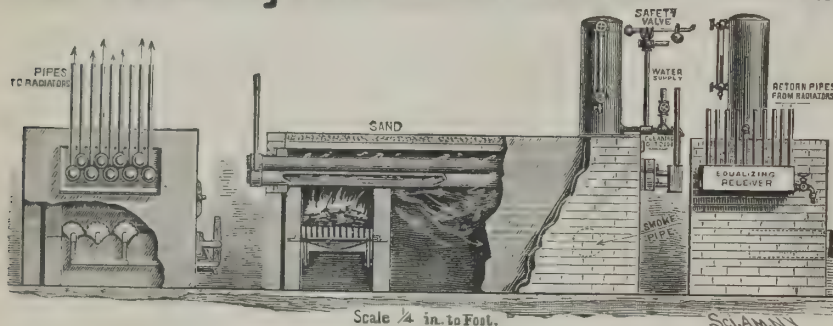
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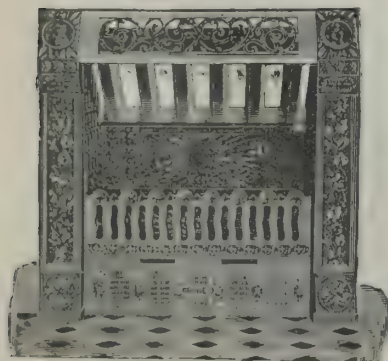
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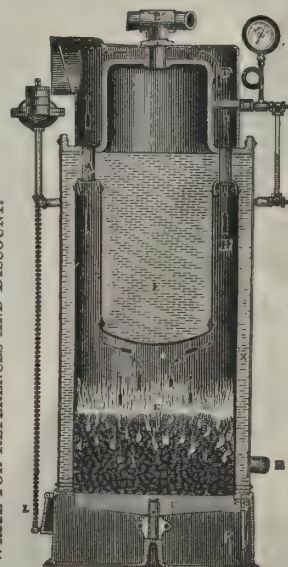
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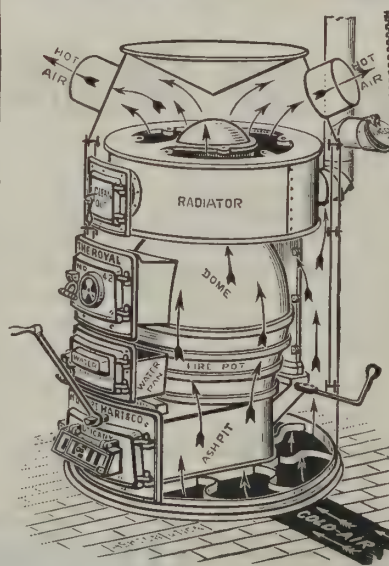
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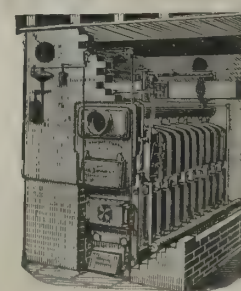


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FORTY-FOURTH ANNUAL REPORT **OF THE** **NEW YORK LIFE INSURANCE COMPANY**

Office: Nos. 346 & 348 Broadway, New York.

JANUARY 1, 1889.

Amount of Net Assets, January 1, 1888.....\$79,912,317.17

REVENUE ACCOUNT.

Premiums.....	\$22,301,931.11
Less deferred premiums, January 1, 1888.....	1,174,340.36
Interest and rents, etc.....	4,762,169.67
Less interest accrued January 1, 1888.....	488,477.59
	4,273,692.08
	\$25,401,282.83

\$105,313,600.00

DISBURSEMENT ACCOUNT.

Losses by death, and Endowments matured and discounted (including reversionary additions to same).....	\$5,425,926.78
Dividends (including mortuary dividends), annuities, and purchased insurances.....	5,541,143.27
Total Paid Policy Holders.....	\$10,967,070.05
Taxes and re-insurances.....	303,062.84
Commissions (including advanced and commuted commissions), brokerages, agency expenses, physicians' fees, etc.....	3,558,440.80
Office and law expenses, salaries, advertising, printing, etc.....	654,690.12
	\$15,489,263.81

\$89,824,336.19

ASSETS.

Cash on deposit, on hand, and in transit.....	\$3,695,836.94
United States Bonds and other bonds and stocks (market value, \$58,222,751.94).....	54,566,901.58
Real Estate.....	9,308,152.08
Bonds and Mortgages, first lien on real estate (buildings thereon insured for \$13,800,000 and the policies assigned to the Company as additional collateral security).....	16,966,932.50
Temporary Loans (market value of securities held as collateral, \$2,144,670).....	1,676,250.00
*Loans on existing policies (the Reserve on these policies, included in Liabilities, amounts to over \$2,000,000).....	378,874.10
*Quarterly and semi-annual premiums on existing policies, due subsequent to Jan. 1, 1889, 1,435,734.88	
*Premiums on existing policies in course of transmission and collection. (The Reserve on these policies, included in Liabilities, is estimated at \$1,500,000).....	1,045,089.46
Agents' balances.....	298,959.43
Accrued Interest on Investments, January 1, 1889.....	451,605.24
Market value of securities over cost value on Company's books.....	3,655,850.36

* A detailed schedule of these items will accompany the usual annual report filed with the Insurance Department of the State of New York.

TOTAL ASSETS, JANUARY 1, 1889, - - - - - \$93,480,186.55

Appropriated as follows:

Approved losses in course of payment.....	\$555,555.62
Reported losses awaiting proof, etc.....	302,964.77
Matured endowments, due and unpaid (claims not presented).....	56,511.88
Annuities due and unpaid (claims not presented).....	28,865.69
Reserved for re-insurance on existing policies, at the Actuaries' table 4 per cent interest.....	78,985,757.00
Reserved for contingent liabilities to Tontine Dividend Fund, January 1, 1889, over and above a 4 per cent Reserve on existing Policies of that class.....	\$5,315,720.83
Addition to the Fund during 1888.....	2,043,665.84
DEDUCT--	
Returned to Tontine policy-holders during the year on matured Tontines.....	\$1,359,386.67
	935,609.54
Balance of Tontine Fund January 1, 1889.....	6,423,777.13
Reserved for premiums paid in advance.....	46,504.21

\$86,397,936.30

Divisible Surplus (Company's New Standard).....7,082,250.35

\$93,480,186.55

Surplus by the New York State Standard (including the Tontine Fund).....13,500,000.00

From the undivided surplus, as above, the Board of Trustees have declared a Reversionary dividend to participating policies in proportion to their contribution to surplus, available on settlement of next annual premium.

Returns to Policy-holders.	Insurance in Force.	Assets.	New Policies Issued.
1886.....\$7,627,230	Jan. 1, 1887.....\$304,373,540	Jan. 1, 1887.....\$75,421,453	1886.....22,027
1887.....9,535,210	Jan. 1, 1888.....358,935,536	Jan. 1, 1888.....83,079,845	1887.....23,522
1888.....10,973,070	Jan. 1, 1889.....419,886,505	Jan. 1, 1889.....93,480,186	1888.....33,334

Number of Policies issued during the year, 33,334. Risks assumed, \$125,019,731.

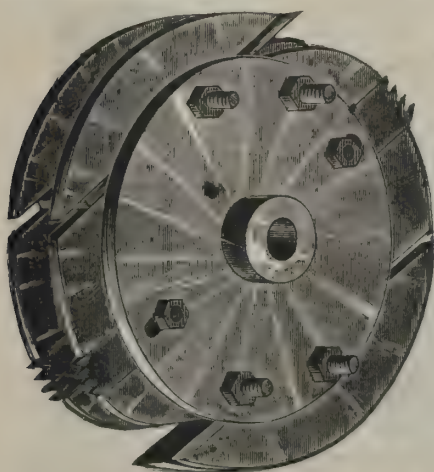
Total number of policies in force January 1, 1889, 129,911. Amount at risk, \$419,886,505.

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WILLIAM H. APPLETON,	JOHN CLAPLIN,	WALTER H. LEWIS,	JOHN N. STEARNS,	HENRY TUOK,
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HENRY BOWERS,	ELIAS S. HIGGINS,	C. C. BALDWIN,		

THEODORE M. BANTA, Cashier.
A. HUNTINGTON, M.D., Medical Director.

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THOROUGHLY TESTED by time, in nearly every land and clime, by hundreds of thousands of people. Its careful examination and use every month will make any bit of earth, indoors or out-doors, to produce abundantly of ALL desirable growing things that are fitted for culture. This is

NO IMPROBABLE WONDER, but is the exact truth, being simply our way of describing that monthly product of knowledge, experience, skill, and hard work--THE AMERICAN GARDEN magazine (which also unites the old *Horticulturist*, the *Gardener's Monthly*, and the *Floral Cabinet*)--to-day unquestionably the foremost monthly periodically devoted to horticulture.

The AMERICAN GARDEN is an illustrated Monthly Magazine rapidly taking rank in popularity and influence among the great magazines.

Subscription price, \$2 a year; 20 cents a copy. Specimen for 10 cents. Good pay to respectable persons, teachers, gardeners, farmers, etc., as agents.

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WATER RAISED TO ANY HEIGHT.
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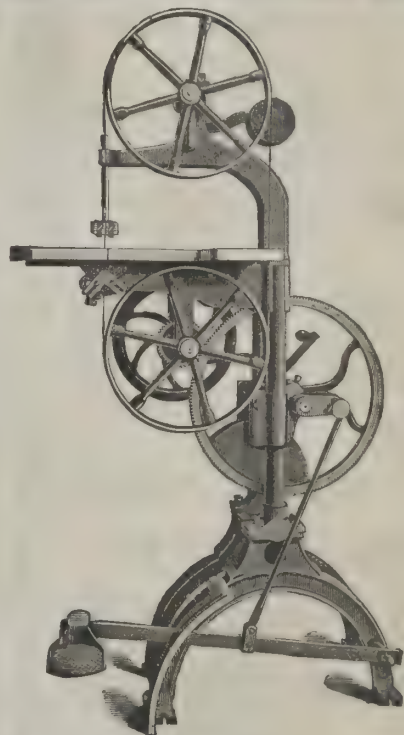


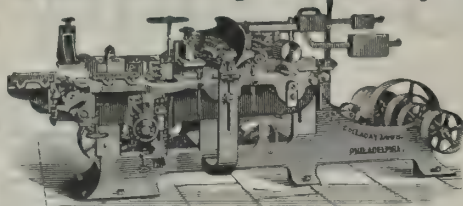
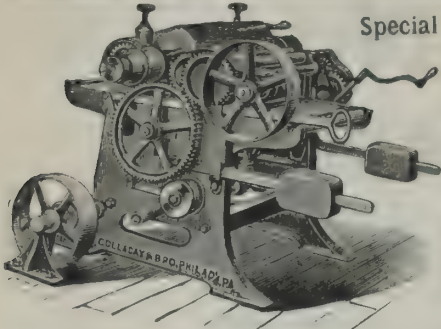
Table is 3 feet 6 inches from floor; measure 18 x 21 inches; is adjustable for cutting on a bevel. Guide for saw both above and below table. Distance from table to guide when raised its full height, 5 inches; 16 inches between saw and frame. All gears cut from solid iron. Shafts are made of steel. Saw pulleys covered with rubber. Upper saw pulley has adjustment to bring it into line with lower saw pulley. Weight of machine, 200 lbs. Machines on trial.

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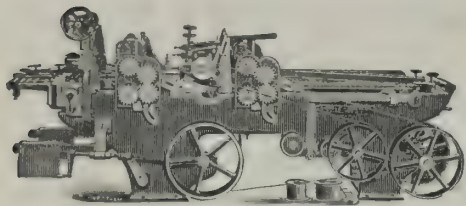
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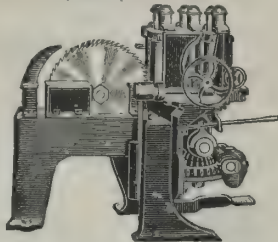


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Woodworking Machinery, Planers and Matchers, Pony Planers, Hand Matchers, Solid Plate and Segment Re-Saws.

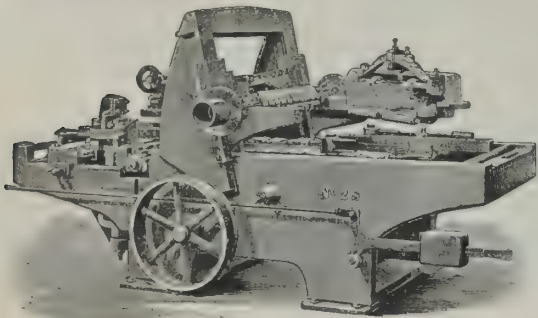


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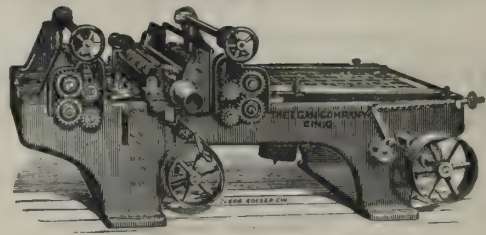
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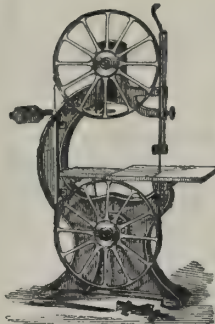


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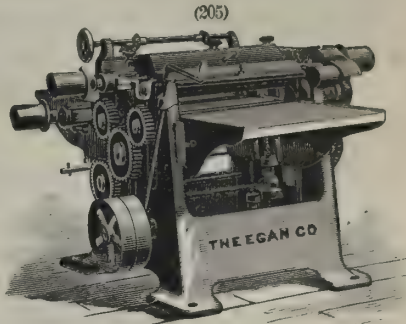
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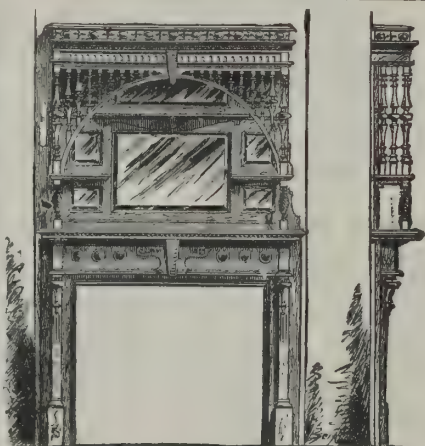
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Planes 26 inches wide and 6 inches thick.

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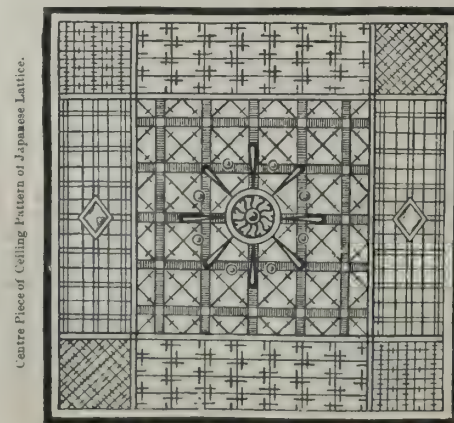


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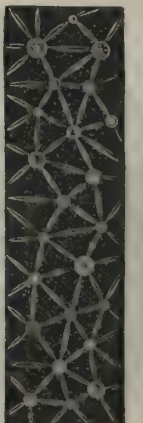
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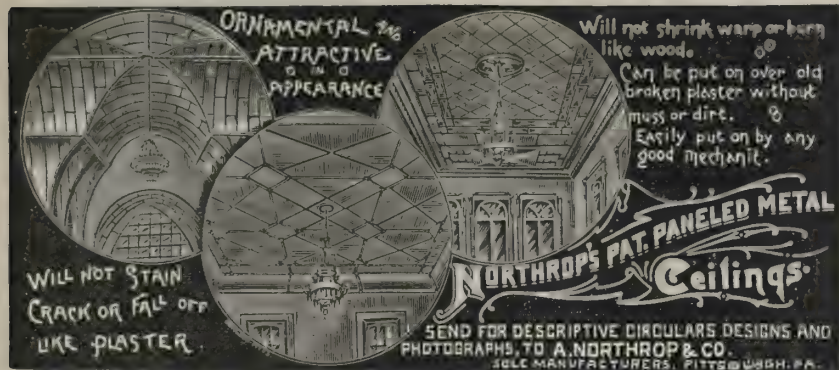
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Can be decorated to meet any requirements. Rain or Water cannot affect it. The arrangement of the panels makes it an artistic study.

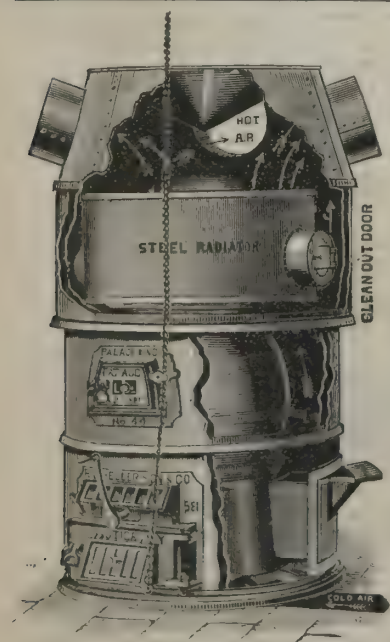
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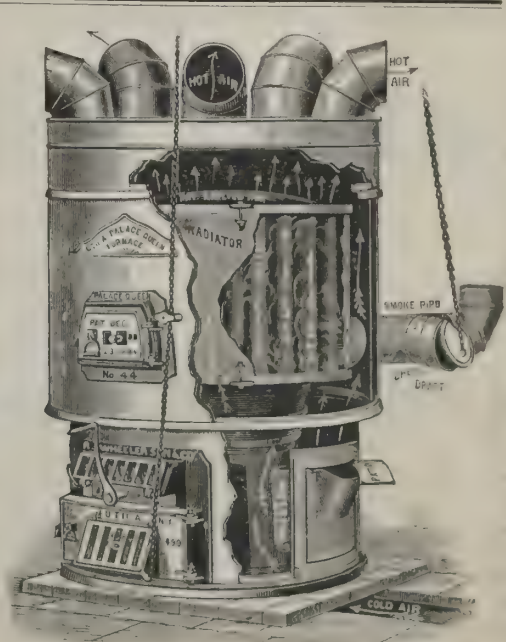
Adjustable Planes. Stanley Rule & Level Co.	Page cover ii	Brass Work for Buildings. Manhattan Brass Co.	Page ix	Creosote Wood Stains for Shingles, Etc. Samuel Cabot.	Page xiv	Fireproofing Material. H. W. Johns Mfg. Co.	Page vi
Advertising Glass Signs. The Western Sand Blast Co.	iv	Brick. Chicago Anderson Pressed Brick Co.	ix	Cutter Heads. Sam'l J. Shimer & Sons.	iv	Foot and Hand Power Machinery. W. F. & J. Barnes Co.	ii
Annunciators. Partrick & Carter.	vii	Peerless Brick Co.	v	Decorative Glass and Sand Blast Work. The Matthews Decorative Glass Co.	vi	C. E. Little	ii
Architects' and Surveyors' Supplies. A. H. Abbott & Co.	cover ii	Brick Machinery. Henry Martin.	v	Decorative Lattice. Cutting & De Laney.	xii	J. M. Marston & Co.	xi
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L. Manasse	iv	Builders' Scroll Saw. W. F. & J. Barnes Co.	ii	Doors, Sash and Blinds. Mankey Decorative Co.	xii	Sebastian May & Co.	vi
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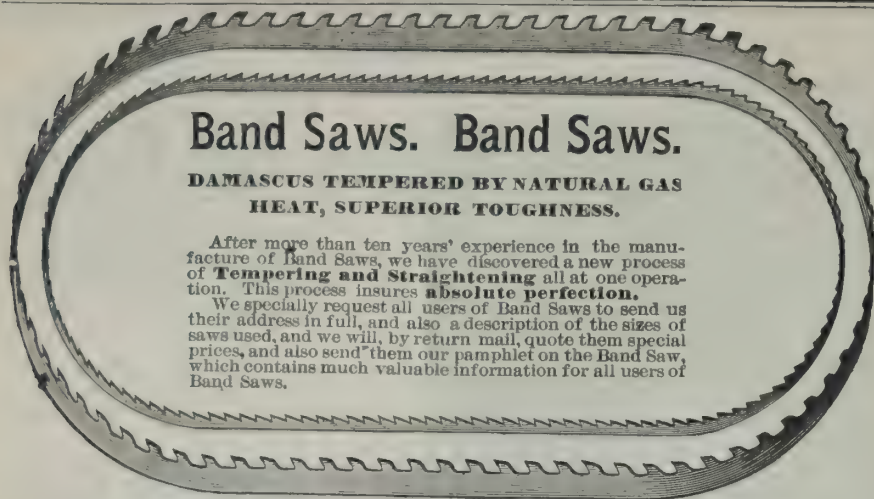
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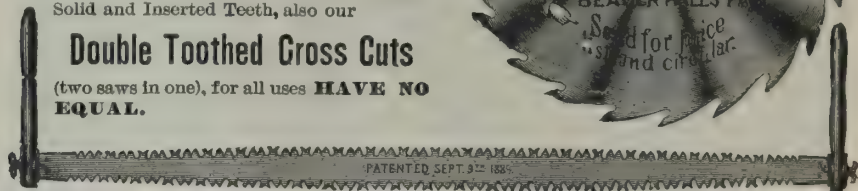
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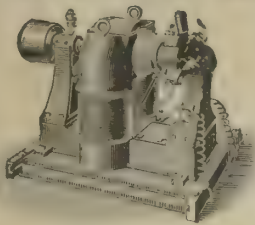
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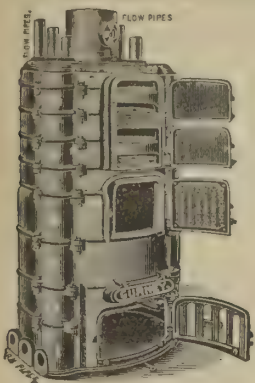


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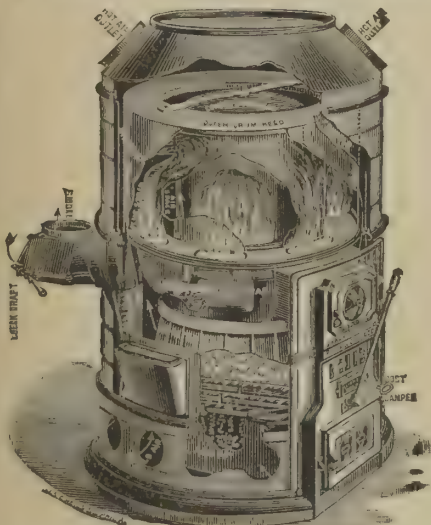
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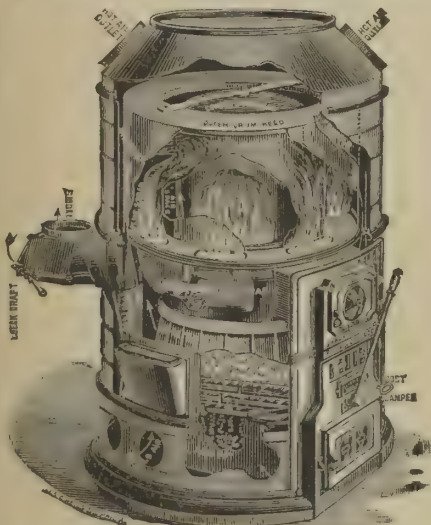
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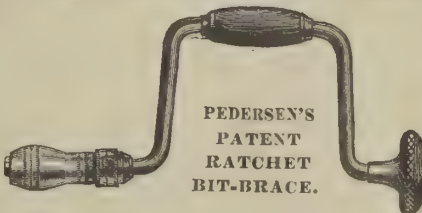
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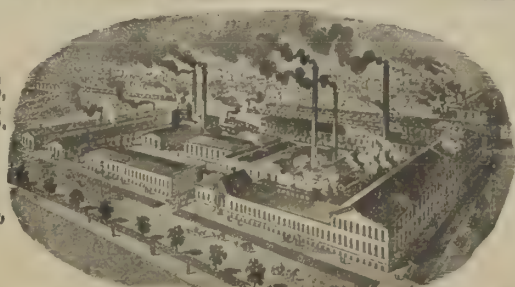
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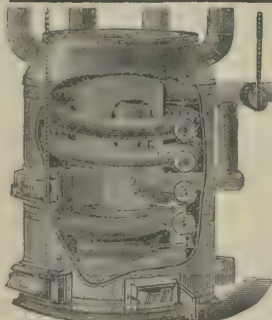
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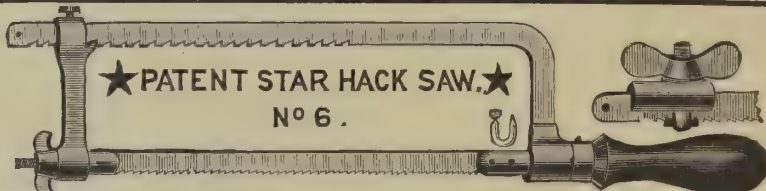
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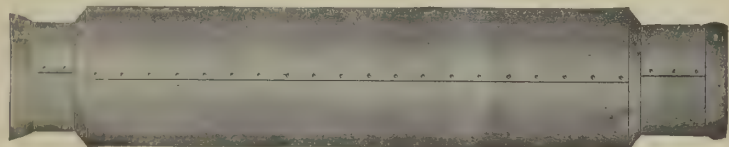
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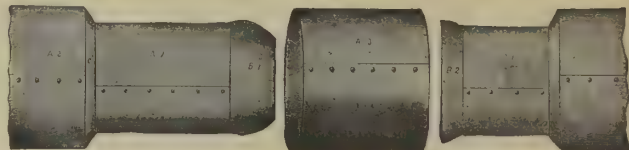
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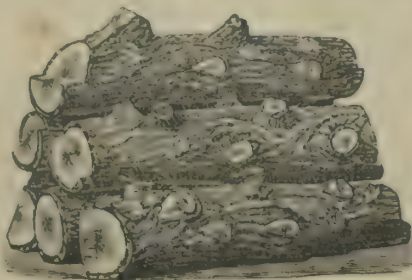
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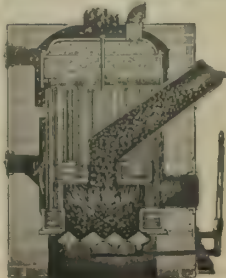
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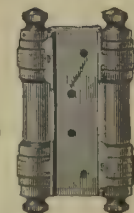
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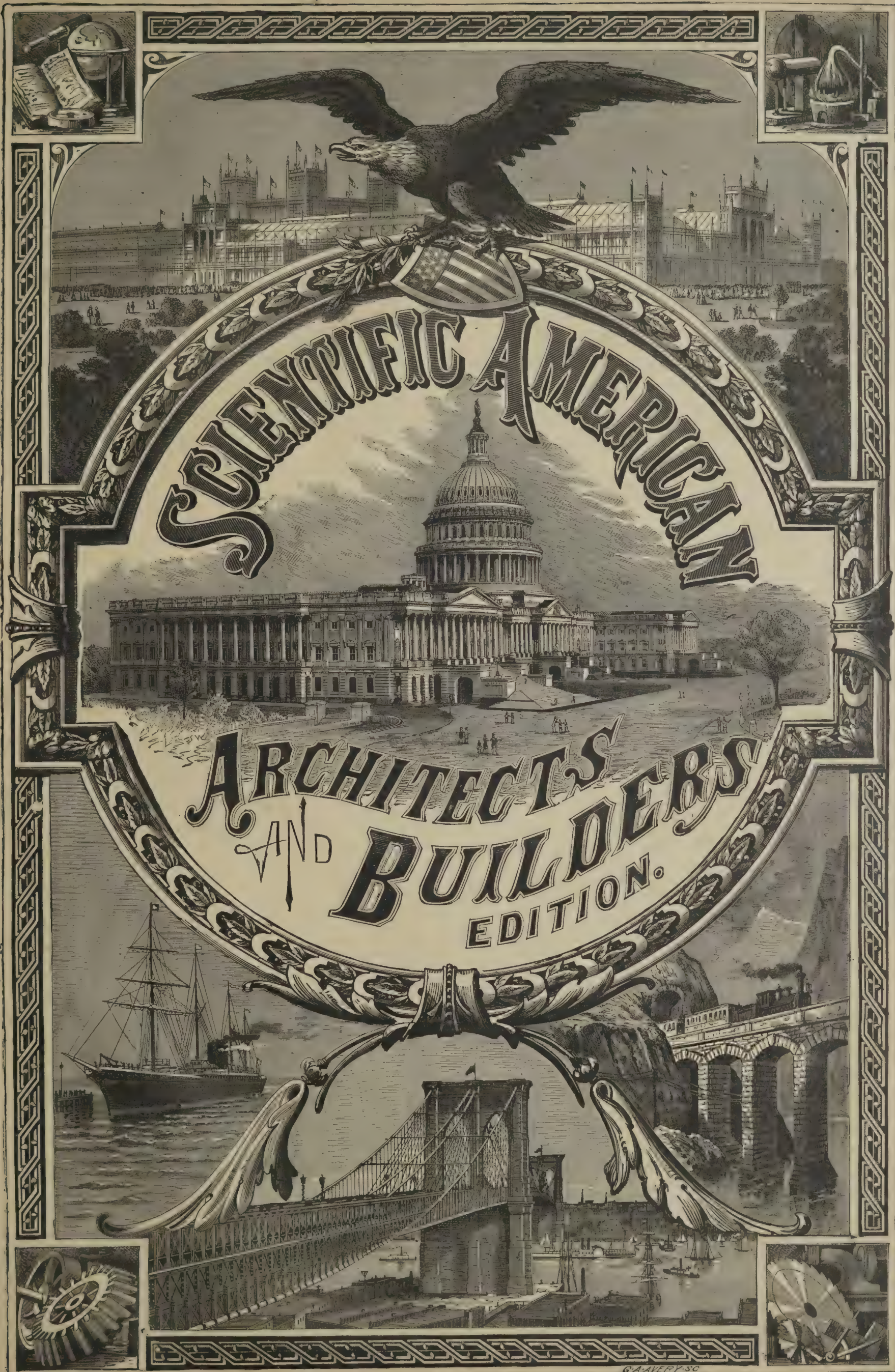
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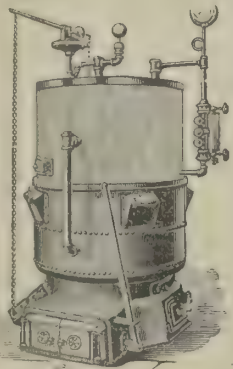
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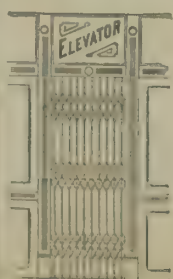
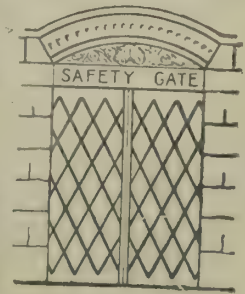
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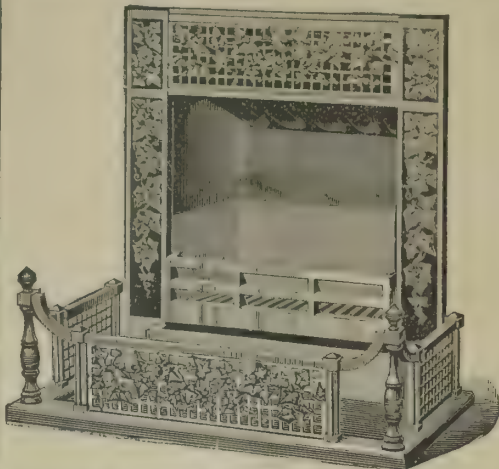
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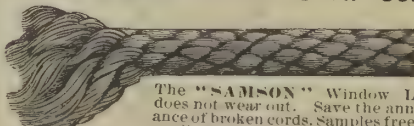
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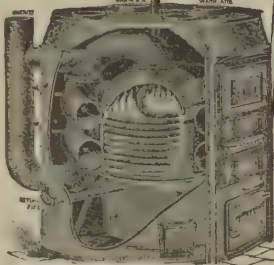
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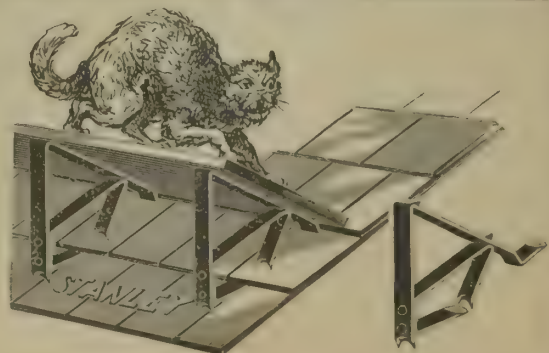
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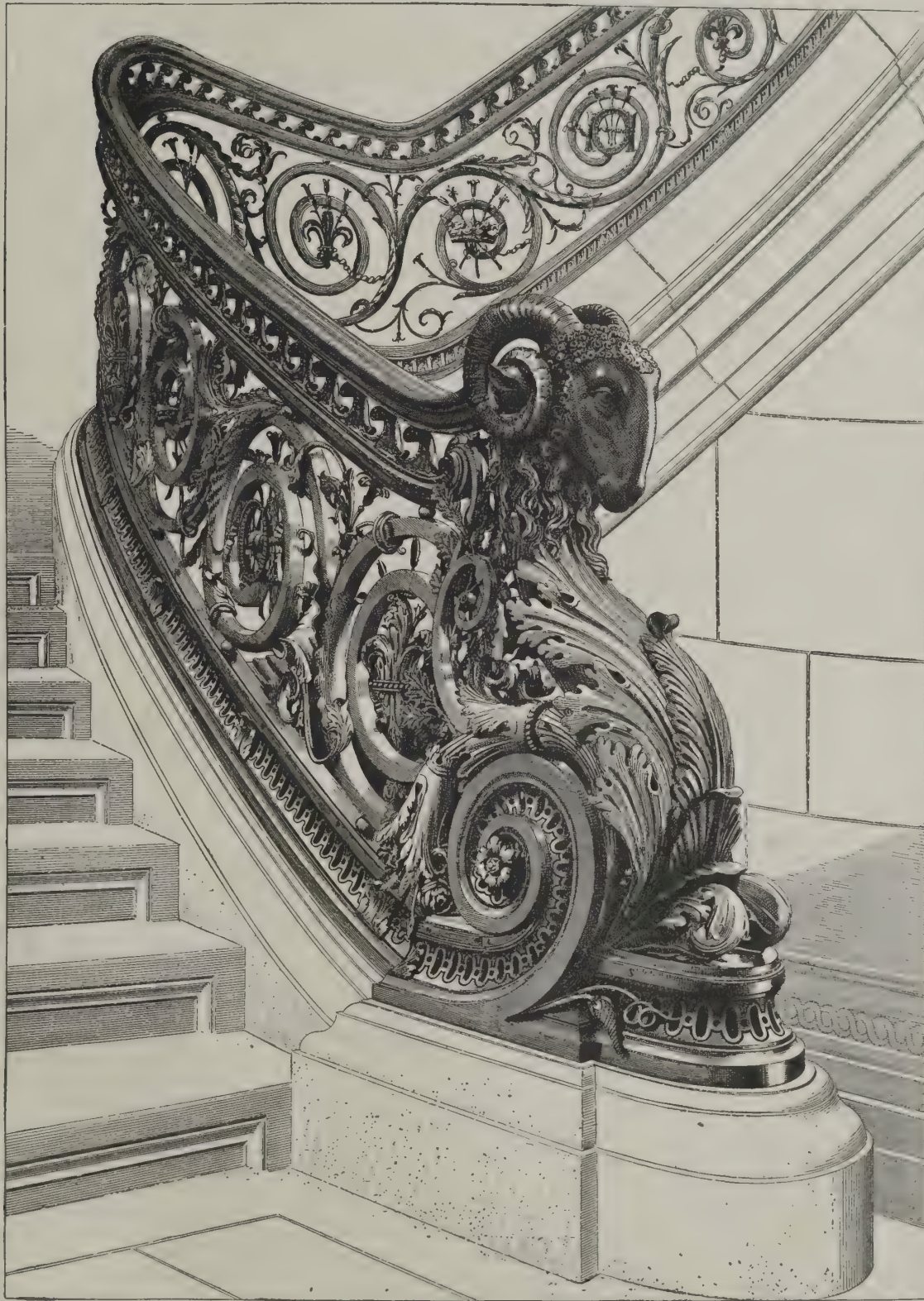
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SOMETHING FOR ARCHITECTS AND BUILDERS TO REMEMBER.

In a large building of modern construction in this city, finished regardless of expense, piped, as supposed, in the best possible manner, the delivery water pipes lately refused to operate. This was five years after the plumbing was put in. The water was supplied from a tank on the roof, into which water from a well was pumped. The vertical main was galvanized iron pipe, 1½ in. diameter, from which, at each story, the supply pipes for the basins and closets branched laterally, these branch pipes being of lead, ¾ in. diameter.

Deposit of obstructive matter in the branch pipes was suspected; the floors were torn up, access to the lead pipes had by cutting them apart, wires inserted, and a great quantity of iron rust extracted, after which the pipes worked as well as usual. It appears the interior of the vertical iron pipe had become corroded, and the iron rust was carried by the water current into the branch lead pipes, where it accumulated until it stopped the flow of the water. The evident moral of this example is that iron water pipes for the distribution of water in buildings should not be employed, as they are liable to corrode and cause stoppage. Iron may be cheap in first cost, but in the long run good lead pipes are more economical.

A DWELLING FOR \$4,000.

One of our colored plates this month shows a convenient and attractive house, of which we give drawings of details on page 66. Size of the structure is 46 x 20 ft., exclusive of bays and piazza.

Height of stories: First story 10', second 9'. Size of rooms: See floor plans. Materials: First story, clapboarded; second story and above, shingled; roof, shingled. Cost about \$4,000.

This dwelling is admirably adapted for a narrow lot. The arrangement of parlor and dining room, which connect by sliding doors, gives a very large floor area for a building of such moderate width. The kitchen, pantries, closets, etc., are well arranged.

The plan of second floor has equal merit. The attic contains two good chambers and trunk room.

Cellar under whole of the house; contains furnace, coal bins, etc.

A RESIDENCE OF MODERATE COST.

This building represented in one of our colored plates presents a variety of special and interesting features.

Reference to the floor plans will show good arrangement of rooms. The parlor is almost circular in form, and is connected to the dining room by a sliding door; open fireplaces are in both rooms. Access from front to rear is gained without making a thoroughfare of any of the rooms, and when the passage doors are closed the kitchen is entirely cut off from the front portion of the house.

A piazza encircles the parlor, and on the right of the entrance the piazza roof terminates in a small circular tower; a seat under this provides a pleasant lookout.

On the second floor the principal chamber is also circular, with a circular bay rising into a tower. There are two other good-sized chambers and a bath room. The front hall on this floor is of large dimensions, with square bay to the front and seat therein. The spiral staircase from this hall is lighted by three large stained-glass windows.

From whatever point the elevations may be viewed, their aspect is equally attractive, the combination of towers, bays, and dormers making this residence particularly inviting.

Size of structure, 45x27 ft., exclusive of piazza.

For size of rooms, see floor plans.

Materials.—Vertical sides shingled throughout; roof shingled. We give a variety of details, of which drawings will be found on page 67.

Interior Finish.

The intrinsic value of mahogany for any work where nicety of detail and elegance of finish are required exceeds that of any other known wood. Cherry also finds much favor on account of its pleasing effect, with some builders, but it soon grows dull and dingy. Oak, which, up to a few months ago, was considered the most fashionable wood, is very attractive when first finished, but experience has taught most people that it does not take long to change all this, and instead of a light, picturesque interior, one that has a dusty, damp appearance is seen, that no amount of scraping, refinishing, and varnishing will restore to its original beauty. Ash, which is apt to present a handsome appearance at first, especially when utilized for interior decoration, is more apt to present a rusty appearance than oak. The causes which are so damaging to most other woods seem to bring out the better qualities of mahogany, which grows richer with age. Of a light tone at first, it becomes deeper and more beautiful with use, and although it may cost a little more at first, yet, considering the length of time it lasts, the expense is not, comparatively, as large as other woods which cost far less money, but that do not last nearly as long. What makes the wood even more valuable is the fact that, unlike cherry, ash, or oak, it is very easily cleaned, be-

cause it is impervious to dust and dirt, and while it does not show wear, it grows brighter and richer instead of growing duller. It is pleasing to the eye, a source of beauty, and a joy as long as it is in the house.—*Building News.*

Nathaniel J. Bradlee.

By the death of Nathaniel J. Bradlee, which occurred suddenly recently, while on the train en route for Keene, N. H., the city of Boston loses one of her foremost business men and most noted architects. He was born in Boston in 1831, received his education at the Chauncy Hall School, graduating in 1846. Leaving school, he entered the office of G. M. Dexter, where he remained until 1856, when he succeeded to the business of Mr. Dexter. Mr. Winslow, of the firm of Bradlee, Winslow & Wetherell, became a member of the firm a short time after, and on Mr. Bradlee's retirement from active business, about five years ago, Mr. Wetherell was admitted.

His best-known work is the removal of Hotel Pelham, which was transferred backward from a site encroaching on Tremont and Boylston Streets to its present location, an engineering feat which at that time was regarded as novel and daring. The occupants of the hotel were not in the least disturbed, and the storekeepers carried on their business without hindrance. After the great fire, his office rebuilt a very large number of buildings in the burnt district, and many buildings in the Back Bay are monuments to his skill. As president of the Boston Water Board, he was chiefly instrumental in securing her present system of supply. The reservoirs at Chestnut Hill were constructed during his term of service, and the largest basin is named "the Bradlee" in his honor. But it is as consulting architect and trustee for large estates that he will be best remembered. Over \$100,000,000 were intrusted to his care, and in the management of this vast sum he displayed untiring activity and admirable judgment. His knowledge of building laws was unexcelled. Almost every large building enterprise undertaken in the city during the last twenty years has been submitted to him for criticism and advice. He was essentially a man of affairs, a factor in the business of his city and country, and his premature death will be a heavy blow to many undertakings.—*Boston Building News.*

Colored Decoration of Churches.

At the recent Art Congress, Liverpool, Mr. E. Prioleau Warren in his paper pointed out the backwardness in decorative art of the ecclesiastical branch as compared with the civil and domestic, and said that in the decorative school of the fifteenth century, the work of which was exemplified in many of our churches, they had ample suggestions for modern use. A protest was entered by the speaker against the neglect of the use of color in churches, and the impression prevalent among architects that the decoration of churches was a matter beyond their scope, and therefore to be relegated to specialists. He expressed the opinion that architects should carefully study color effects, should design their buildings with the view of receiving the colors, and should be their own decorators.

A MODIFIED QUEEN ANNE.

The cottage is built at East Orange, N. J. Our engraving was prepared direct from a photograph of the building made especially for the SCIENTIFIC AMERICAN. The design, we are informed, is by Mr. J. Baker, architect, Newark, N. J.

The foundation is of stone; the underpinning of circular bay at front, piazza columns, and chimney at side are laid up with brick in a random manner.

The first story is covered with beveled white pine clapboards, the second story shingled; the roof is covered with octagonal cut slates.

The inside trim throughout is of white pine finished in the natural; the door and window casings are beaded, with turned sunk angle blocks.

The first floor contains four large rooms, with fireplace in each, and hardwood mantels. There are sliding doors between the principal rooms, and the hall is finished in ash, with ash floor laid in narrow widths; staircase, newels, posts, balusters, and rail are of the same material.

The kitchen is large, and is wainscoted, fitted up in the best manner, and provided with closet, shelves, and pothooks, and the butler's pantry is fitted up with drawers, shelves, and cupboards. Four steps from kitchen lead to landing of main staircase. Stairs lead from kitchen to cellar, which has an outside entrance. The cellar is cemented and contains furnace and laundry rooms, wash trays, etc.

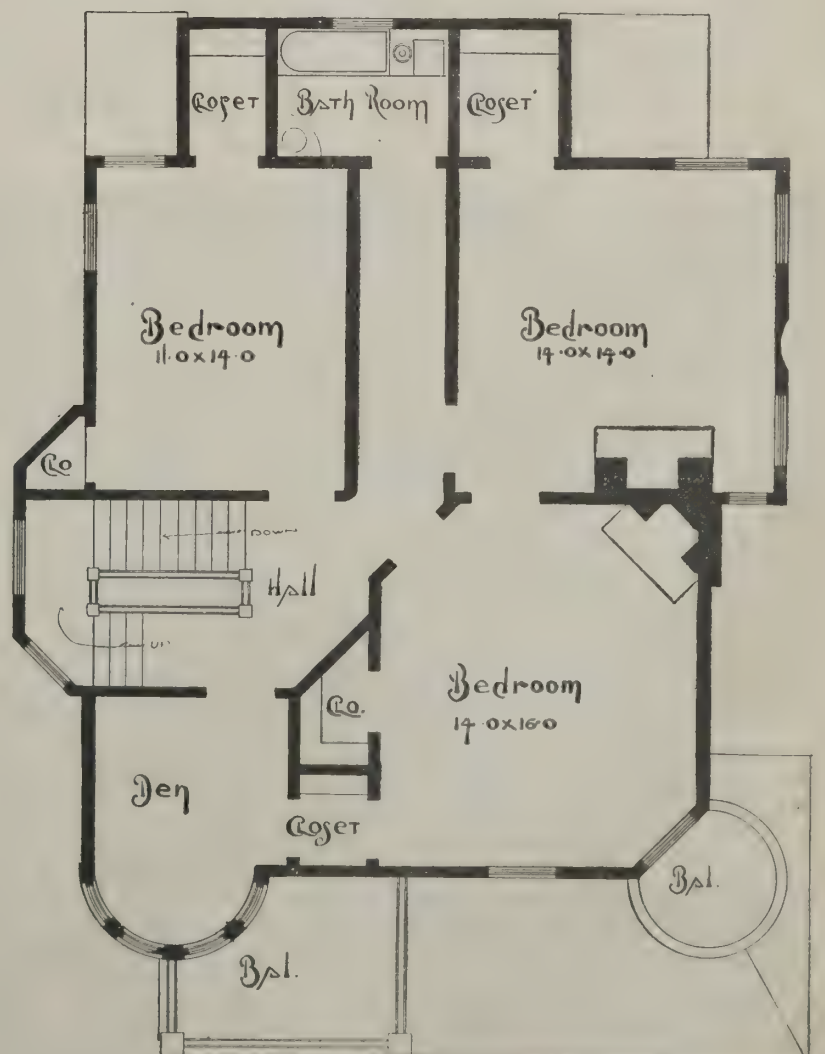
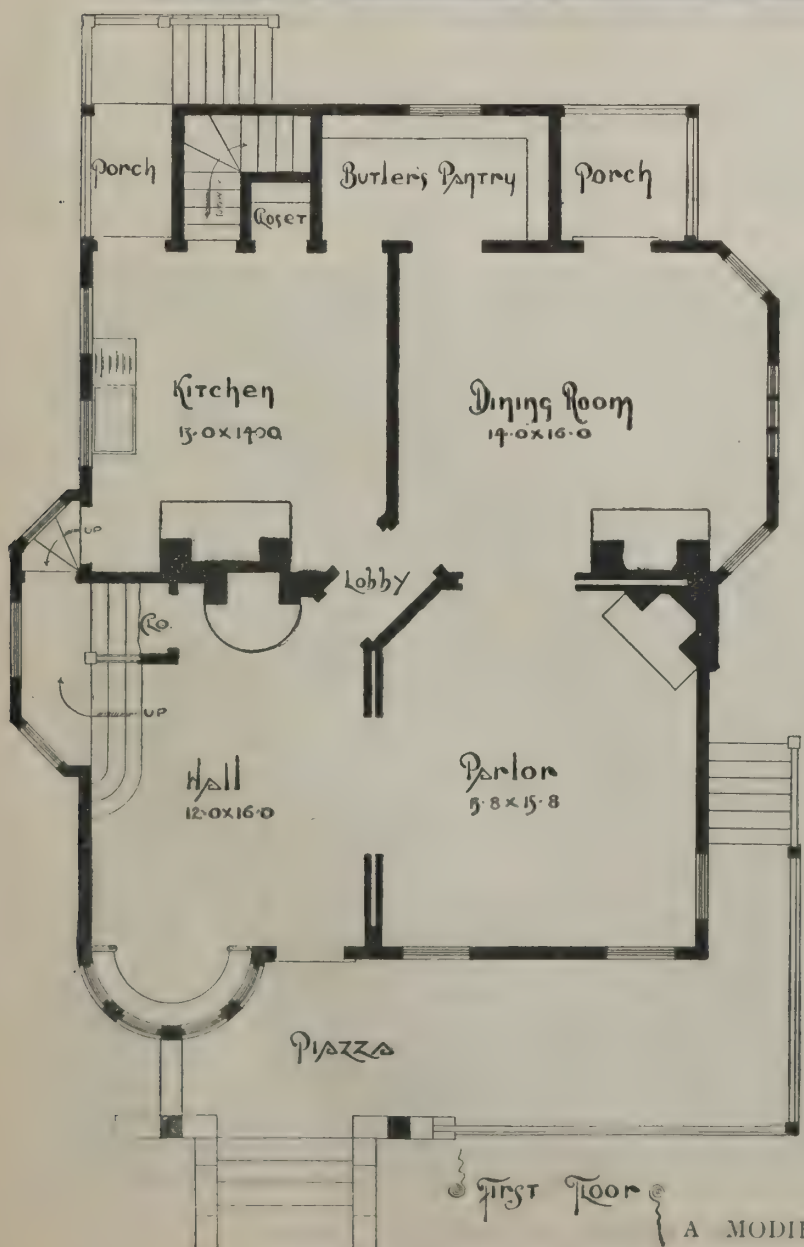
There are four bedrooms on second floor with closets, with drawers and shelves complete; two of these bedrooms have open fireplaces.

The bathroom is wainscoted.

There are three bedrooms and trunk-room finished off in attic.

The house is piped for gas, and the ceilings are all corniced and have center pieces.

Cost, \$6,500. In some localities it might be built for less.



A MODIFIED QUEEN ANNE.

THE HOME OF PETER THE GREAT AT ZAANDAM.

The little Dutch town of Zaandam is situated on the Y, about eight miles from Amsterdam, whence it is within easy reach by train and steamer. It is well worth a visit from the tourist, as it contains the identical hut—in a fairly good state of preservation—which Peter the Great inhabited during a portion of the seven or eight months which he spent in the town in 1697, when obtaining a practical insight into the art of shipbuilding. Zaandam is a typical Dutch village, with

Czar Peter himself and his secretary. These last have been placed there comparatively recently. The second compartment, which was evidently the living room, contains several rude oak chairs, a table, and a loft ladder. The cupboard-like aperture formed the Czar's sleeping quarters, barely a few feet square. There are several interesting tablets affixed to the walls—one, the largest, over the table, having been placed there by the King of the Netherlands, in commemoration of his visit; and another by the late Czar, bearing the in-

boast of the largest modern architectural work yet erected in India, and the Victoria Terminal Buildings, the name given them on jubilee day, are believed to be the most extensive in the world. The execution of this work occupied ten years, and was completed at the end of May last. The total length of the principal or west facade of the buildings is over 1,500 feet. The cost of the buildings was about twenty-seven lacs of rupees. The author of the design is Mr. F. W. Stevens, F.R.I., B.A., A.M.I.C.E., late of the public works depart-



1. A launch in 1697. 2. Room in the house, showing Peter the Great's cupboard-bed. 3. Peter the Great's house (the smaller one on the left; the larger house was demolished some time ago). 4. Peter the Great's house, with a modern house of brick built to protect it.

SCENES AT ZAANDAM, HOLLAND, WHERE THE CZAR PETER THE GREAT LEARNED SHIPBUILDING IN 1697.

its quaint buildings, its wide, straight streets, lined with dwarf trees, and intersected with canals, while some three hundred windmills are busily at work in all directions. The chief attraction, however, is the wooden hut which once formed the dwelling of the great Czar. This stands in a group of other timber houses, several of which, from their dates, are evidently contemporaneous with the historic structure. Czar Peter's dwelling is some thirty feet long by fifteen broad, and is divided into two compartments. One of our illustrations shows two cottages. The smaller is the Czar's dwelling; the larger, now demolished, being another building altogether. The little outhouse leaning against a wall by the door has been removed; but, otherwise, the building has survived the ravages of time. One of the compartments, which is without a fireplace, was evidently used as a workshop, and is simply a room with two windows of tale in panes of some three inches square. Several paintings are in the room—portraits of several czars, including those of

scription, "Nothing too little for the great." There is a cozy fireplace with a carved oak shelf, the mantels being lined with the celebrated tiles such as have been manufactured by the Zaandamites for the last four centuries. In 1832 the hut was discovered to be a foot under water; so the authorities took it in hand, drained and cleaned it, and erected over the precious structure a light brick building to preserve it from any further decay. The ship yard—scarcely a stone's throw from the cottage—bears little, if any, likeness to its appearance two centuries since, as the people of Zaandam have almost entirely lost the reputation which they then possessed as shipwrights, and hardly a relic remains, beyond the Czar's hut, to remind the visitor of Zaandam's past greatness. Our illustrations are from a photograph by D. Engel, Zaandam.—*The Graphic*.

THE NEW GREAT INDIAN PENINSULAR RAILWAY VICTORIA TERMINAL BUILDINGS, BOMBAY.

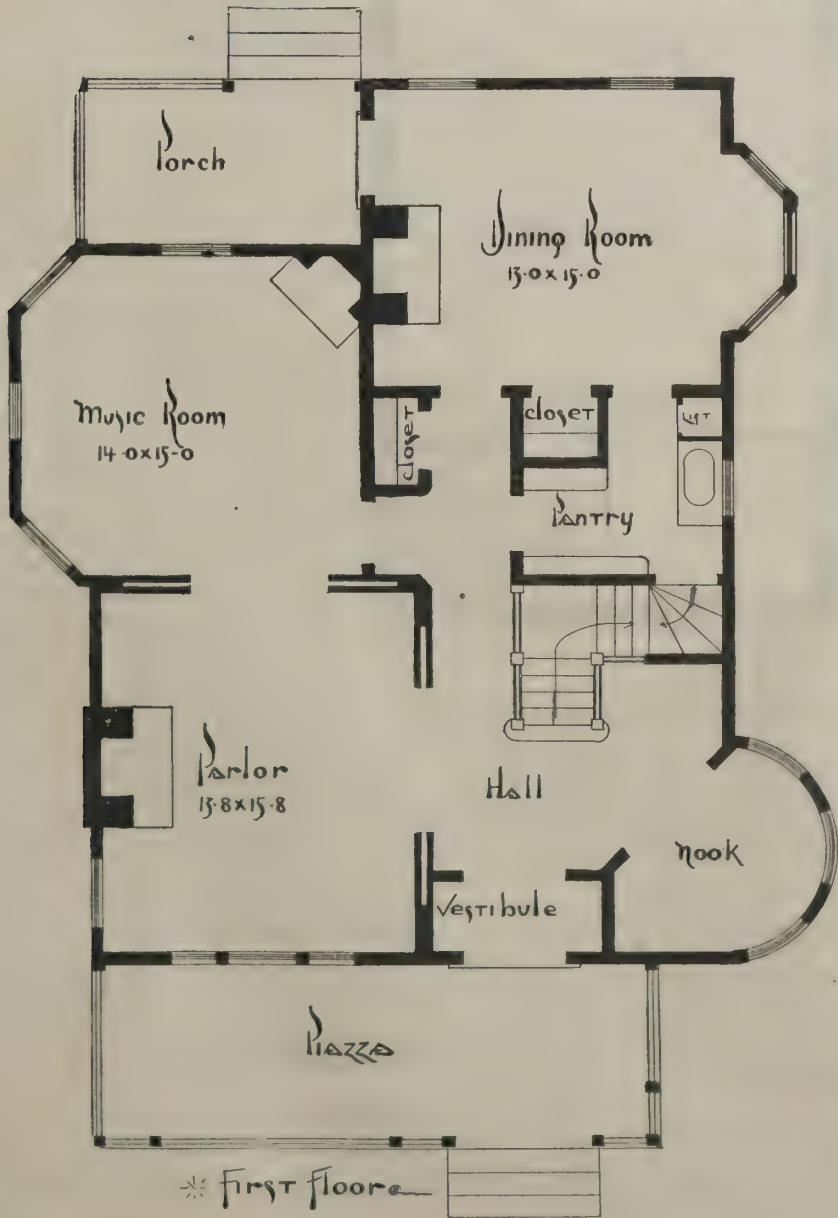
Bombay, the second city in the empire, can now

ment, who also supervised the erection of the buildings from the commencement to the end.

The site on which the buildings are erected is one of the finest in the city, and faces that on which it has recently been decided to erect the new municipal buildings, of which Mr. Stevens is also the architect. The style of architecture adopted is a free treatment of Venetian Gothic with an Oriental feeling, which has been proved to be the best adapted for the climate of Bombay. The principal feature of the edifice is the large central masonry octagonal dome, which has a very fine and dignified effect, and can be seen from all parts of the city. The dome is of solid cut stone masonry, and its construction is exposed to view both inside and out. It crowns the grand central staircase of the administrative offices. The drum is pierced by eight two-light lancet windows, glazed with stained glass of ornate design, the arms and monogram of the company being freely introduced. The apex of the dome is crowned by a colossal figure in stone of "Progress,"



THE NEW STATION AND OFFICES OF THE GREAT INDIAN PENINSULAR RAILWAY, BOMBAY.



A COTTAGE AT EAST ORANGE.

16 feet 6 inches in height, which has a very imposing effect from below. The principal gables are crowned with groups of colossal sculpture representing Engineering, Architecture, Commerce, Science, and Trade, and under a canopy below the large clock in the central gable is placed a beautiful statue of H. M. the Queen-Empress, typical of the state, the railway being guaranteed by the government. On the piers of the large central entrance gates to the administrative offices are placed colossal figures of a lion and tiger, representing respectively the United Kingdom and India. Medallion heads, in full relief, of various noblemen and gentlemen who have interested themselves more or less in railway enterprise in India have been placed in the circular panels over the outer arches of the corridors. The statuary and heads were executed by Messrs. Earp & Son, Lambeth, under the direct supervision of Mr. W. Emerson, architect.

The interior of the buildings has been most skillfully arranged, and fitted up in an appropriate and artistic manner. Colored polished marbles and granites have been used in the halls, waiting rooms, and refreshment rooms, which have an imposing and pleasing effect. All the foliated sculpture was designed and modeled by Mr. Gomez and the students of the Bombay School of Arts, under the able supervision of Mr. J. Griffiths, the principal. The whole of the work has been carried out by native workmen in a most substantial and workmanlike manner, and is equal to anything of the kind in Europe.

The government of Bombay have recorded the eminent services rendered by Mr. Stevens in connection with this vast work, and the directors of the Great Indian Peninsular Railway Company have marked their appreciation of his services by recommending him an honorarium of 5,000 rupees.—*London Graphic*.

THE NEW BIOLOGICAL LABORATORY, PRINCETON COLLEGE.

We give engravings, perspective, and plans of this new structure, which, in external appearance, is an elegant addition to the Princetonian buildings. It was designed by A. Page Brown, architect, of New York; contracting builders' Cubberly & Kafer, Trenton, N. J. The building occupies a ground space of 30 ft. by 52 ft.

As shown in the accompanying plate, the building is in the Romanesque style, and was designed with the double object of offering an attractive exterior and an interior with abundance of light and space for purposes of laboratory instruction. The exterior finish is in the Perth Amboy speckled brick, with terra cotta mouldings and arches, and sandstone window sills. The roof is finished with dark Spanish tiling. Over the main entrance is an elaborate tablet with the motto and inscription of the class. The interior arrangement is for the accommodation of undergraduate elective classes in the elementary courses in vertebrate anatomy, embryology, and physiological psychology, with separate rooms for graduate students in these branches. The main morphological laboratory upon the second floor is for the former. The large working tables, for four students each, are placed at right angles to the windows, and thus adapted both for dissection and microscopic work. In the center of the room are the water fixtures and the demonstration tables. The end wall spaces are fitted with instrument and reagent cases, and between the windows are hung diagrams and charts. The present maximum accommodation is for thirty-two students working at once. Opening into the laboratory is the library, provided with all the general works, which are readily accessible, and also special works borrowed from the college library, in connection with certain courses. The embryological laboratory, on the first floor, is equipped for university students who are pursuing advanced courses or engaged in original research. It is in charge of the Class of '77 University Fellow in Biology. The physiological laboratory is designed for experimental work in psychophysics, but has not as yet been fully furnished. The basement is provided with aquaria. We are indebted

to the *Princeton College Bulletin* for the foregoing particulars.

COTTAGE AT EAST ORANGE.

The design, by Mr. J. Baker, architect, is neat, and the plans are arranged to advantage. Features of the exterior are the chimney at side, the piazza across the front, with posts made to resemble bamboo, and the tower at corner.

The foundation is of stone, with underpinning of brownstone, laid up in a rough manner. The first and second story is covered with beveled white pine clapboarding; above second story windows it is shingled. The roof is covered with octagonal cut slates.

There is a cellar under whole of the house, with a kitchen and laundry combined in the rear; the front part of cellar has cemented bottom; the kitchen is wainscoted. There is a lift from kitchen to butler's pantry, and stairs lead to butler's pantry on first floor.

closets. The bath-room is wainscoted white pine. Two rooms are finished in attic. The house is piped for gas.

Our engraving was prepared direct from a photograph of the building made especially for the *SCIENTIFIC AMERICAN*.

A RESIDENCE AT ROSEVILLE.

This house was built recently at Roseville, New Jersey; the engraving was prepared from a photograph of the building especially taken for the *SCIENTIFIC AMERICAN*. The design, we are informed, is by Mr. Havel, architect, Newark, N. J.

The construction is of the usual kind, and substantial.

The underpinning is of brick, with foundation of stone, and the exterior is covered with clapboarding. The roof is covered with slates.

The cellar is cemented, and contains laundry and furnace. The first floor is laid in ash in narrow widths.

The trim of first floor is of cherry, except the dining room, which is finished in oak; the rest is of white pine finished in the natural.

Two rooms finished in attic, and ample room for storage, etc.

The ceilings are corniced, and center pieces provided. The house is piped with gas.

Cost, \$5 000.

A COTTAGE AT ROSEVILLE, NEW JERSEY.

There is a cemented cellar bottom under whole house, provided with heater. The laundry is in the cellar.

The foundation is of stone, and the first story is a combination of stone, brick, and wood. The circular bay, balustrade, and arch to piazza, and all the first section of house, is of brownstone; middle section is of brick, and the rear of wood.

The second story is covered with clapboarding; the gables are covered with shingles; the roof is also shingled.

Rooms are large and spacious, provided with all the modern improvements.

The vestibule, hall, and study are finished in oak, and wainscoted four feet high. Staircase built of oak, and run to attic.

The dining room is fitted up in California redwood, ceiling the same, in panels.

The first floor is laid in narrow widths of ash.

The kitchen is wainscoted, narrow beaded white pine.

One room finished off in attic, and ample storage room.

The walls throughout are finished with a brown coat, and painted in tints.

The house is piped for gas. Designed by W. D. Peck, architect.

We are informed this cottage was built for \$7,000 complete.

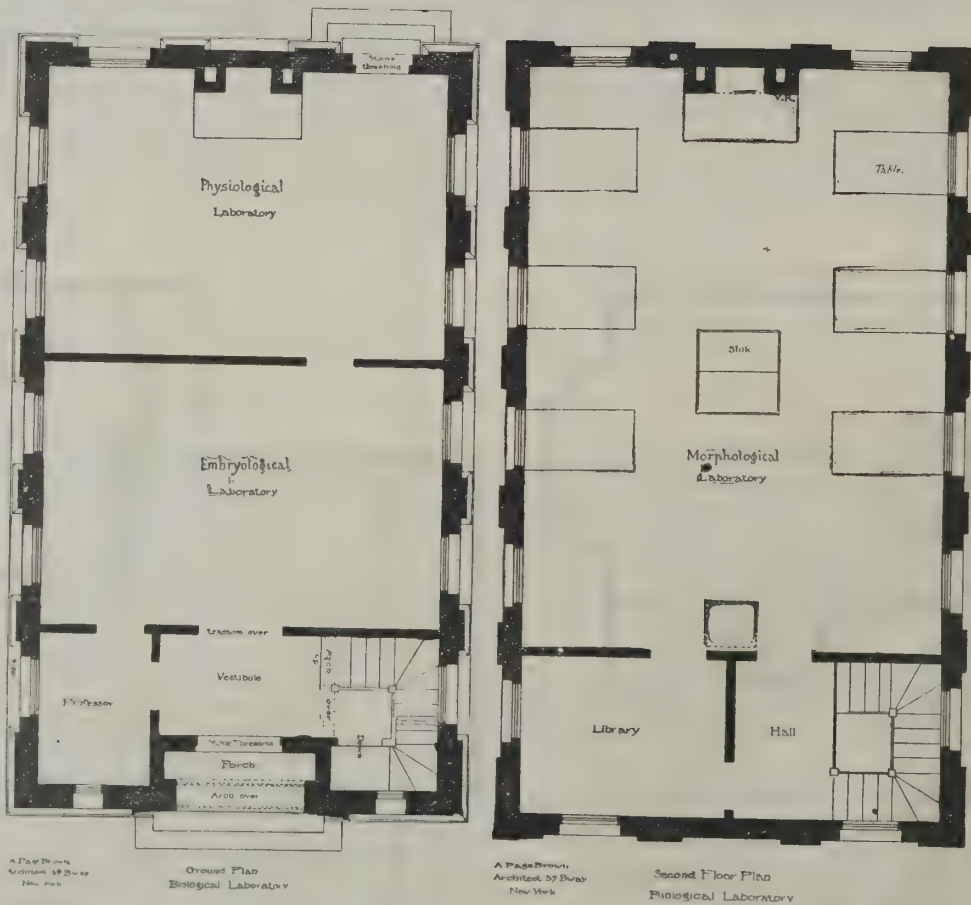
On Estimating.

I have found in my own practice ordinary country cottages of wood will cost from \$2 to \$5 per square foot of plan. Country cottages of the better class, from \$5 to \$10. Brick dwellings in blocks, from \$10 to \$20, and so on. This method of estimating was adopted by a celebrated French architect, Mons. Leonfouche, who became so expert that he was able to estimate quite as accurately as the builders, and in

consequence won a large patronage, especially in the designing of domestic buildings. It was his custom to keep a record of every building erected, with a small sketch of the ground plan and a brief description of the materials, finish, etc. The best way is to keep a record of the cost of every building, giving the results by both the cubical contents and square feet of plan.

Small buildings of the same description are more expensive than the large ones, as the preliminary preparations, cartage, scaffolding, loss of time, etc., are about the same in each case, while the cost of materials in large quantities is much less, all of which must be considered.

The mason work, rough carpenter work, and roofing are the chief items of expense in factories, barns, sheds, outbuildings, etc.; the interior finish and decorative work in dwellings and other highly finished structures, —D. W. King, in *Building*.



THE NEW BIOLOGICAL LABORATORY, PRINCETON COLLEGE, NEW JERSEY.

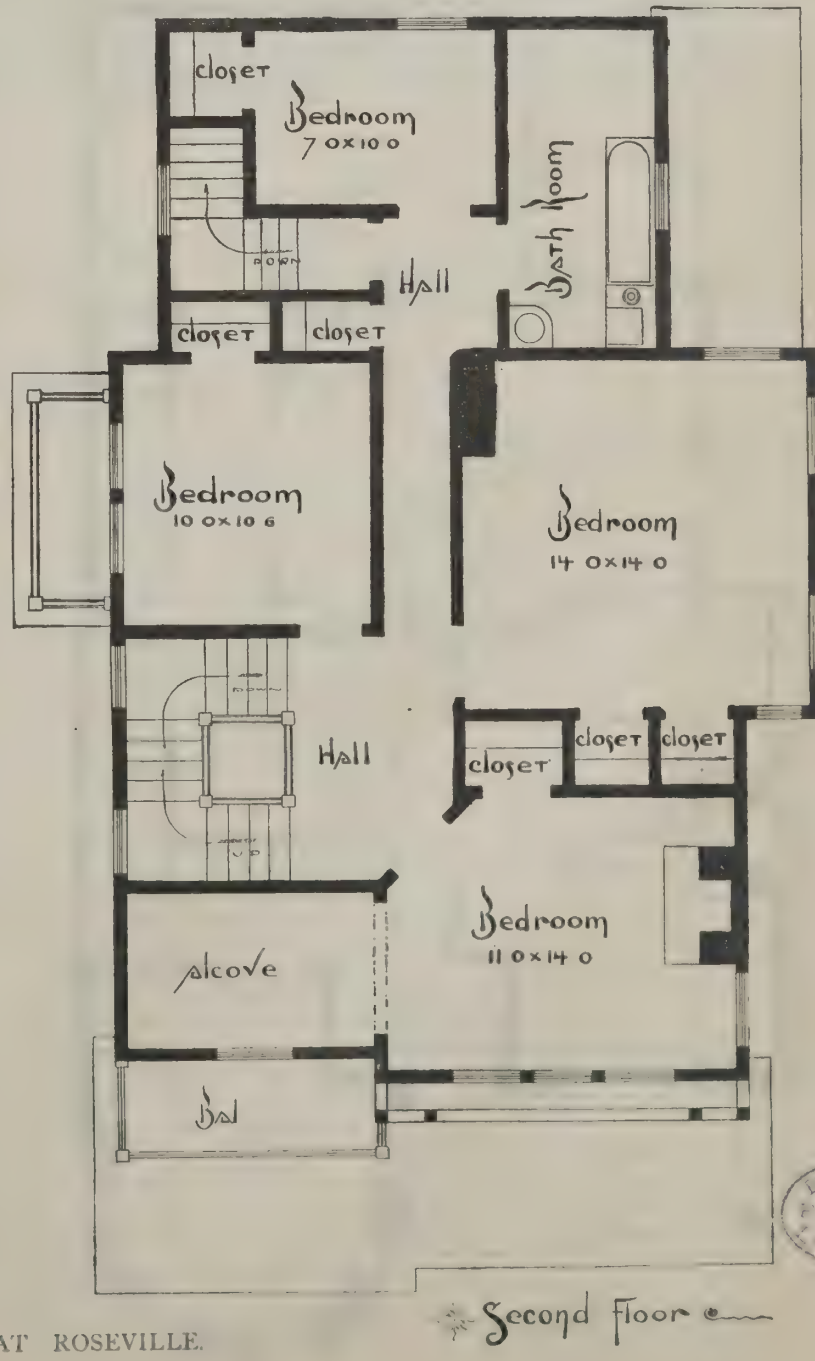
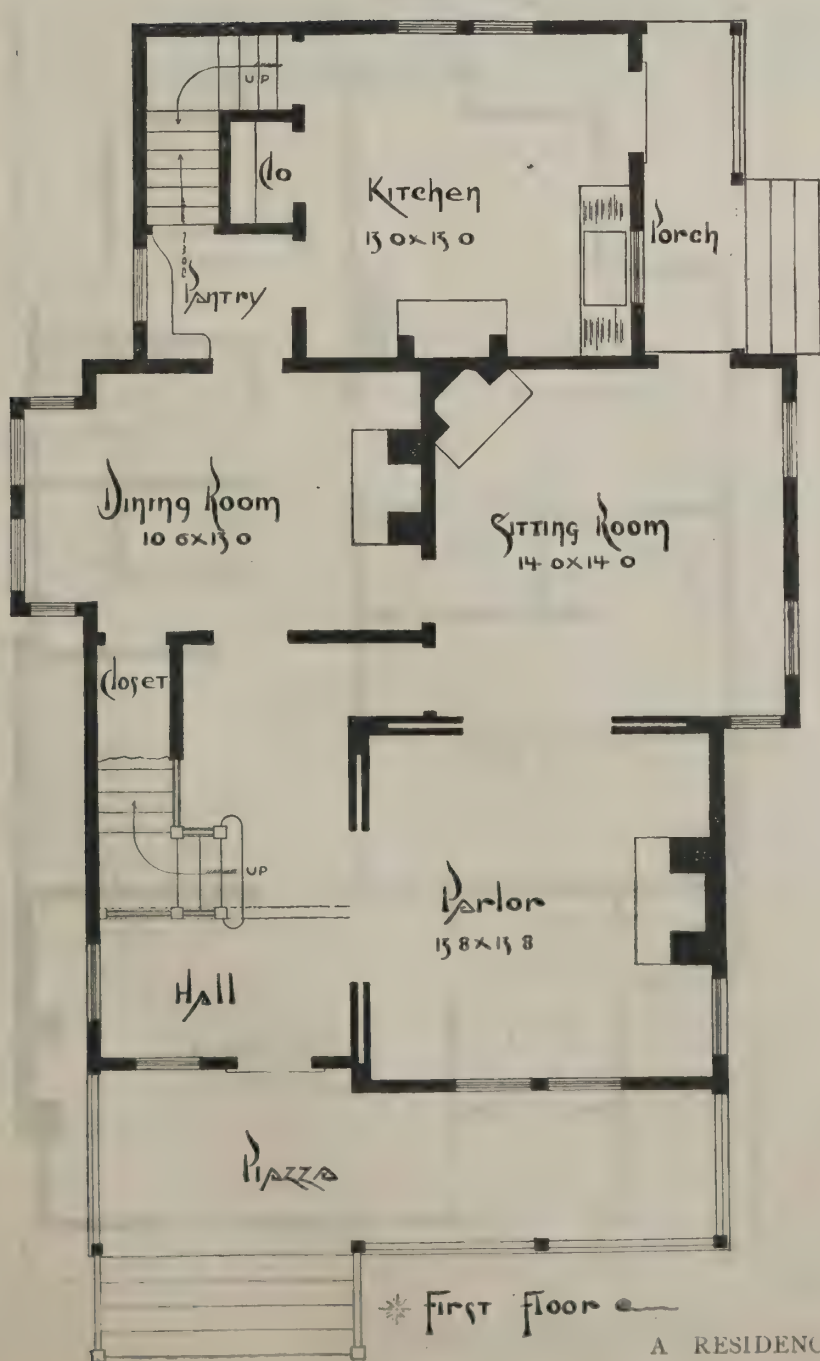
The first floor contains a vestibule, with nook at the right of entrance hall. The hall is finished in white-wood. The staircase, newels, posts, balusters, and rails are of whitewood. The window on this staircase is of stained glass.

The trim to parlor is oak and ash, the music room red-wood. The dining room and rest of the woodwork throughout is of white pine. The door and window casings are beaded, with turned sunk corner blocks.

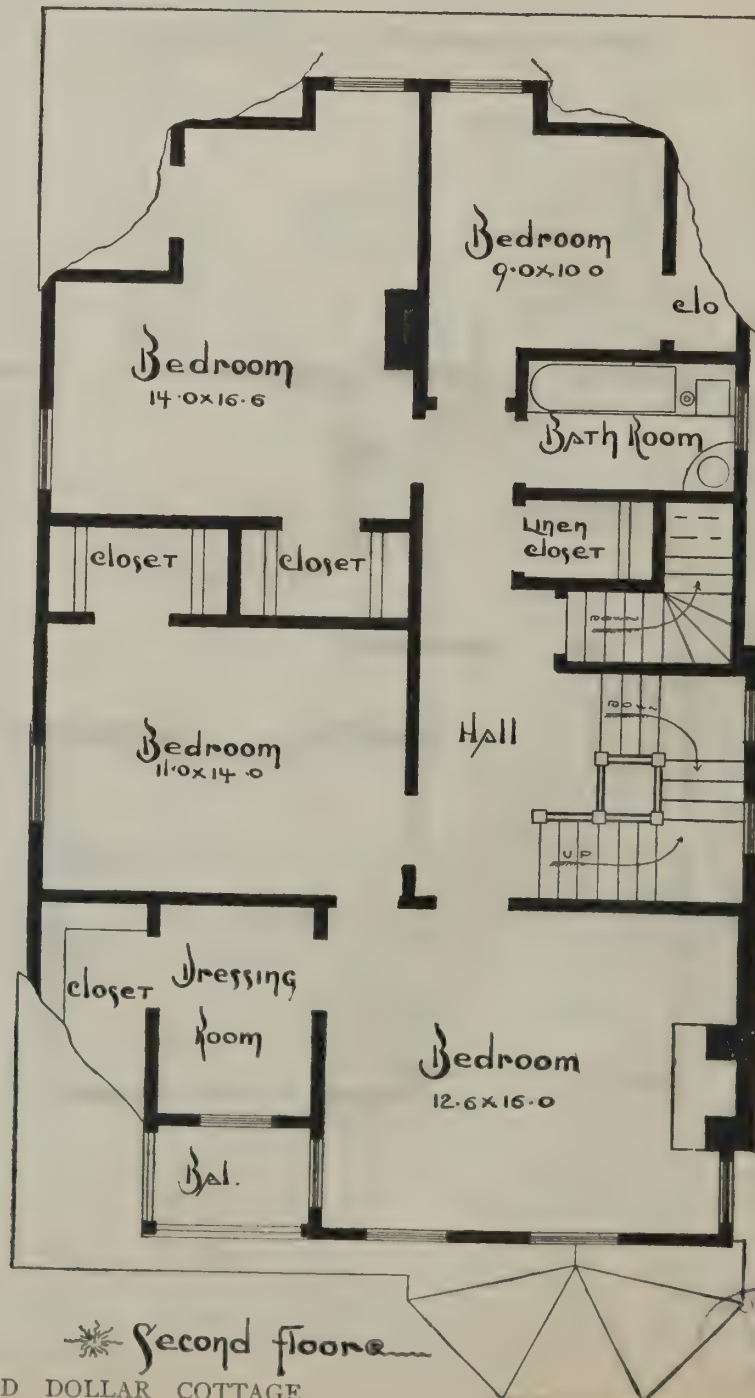
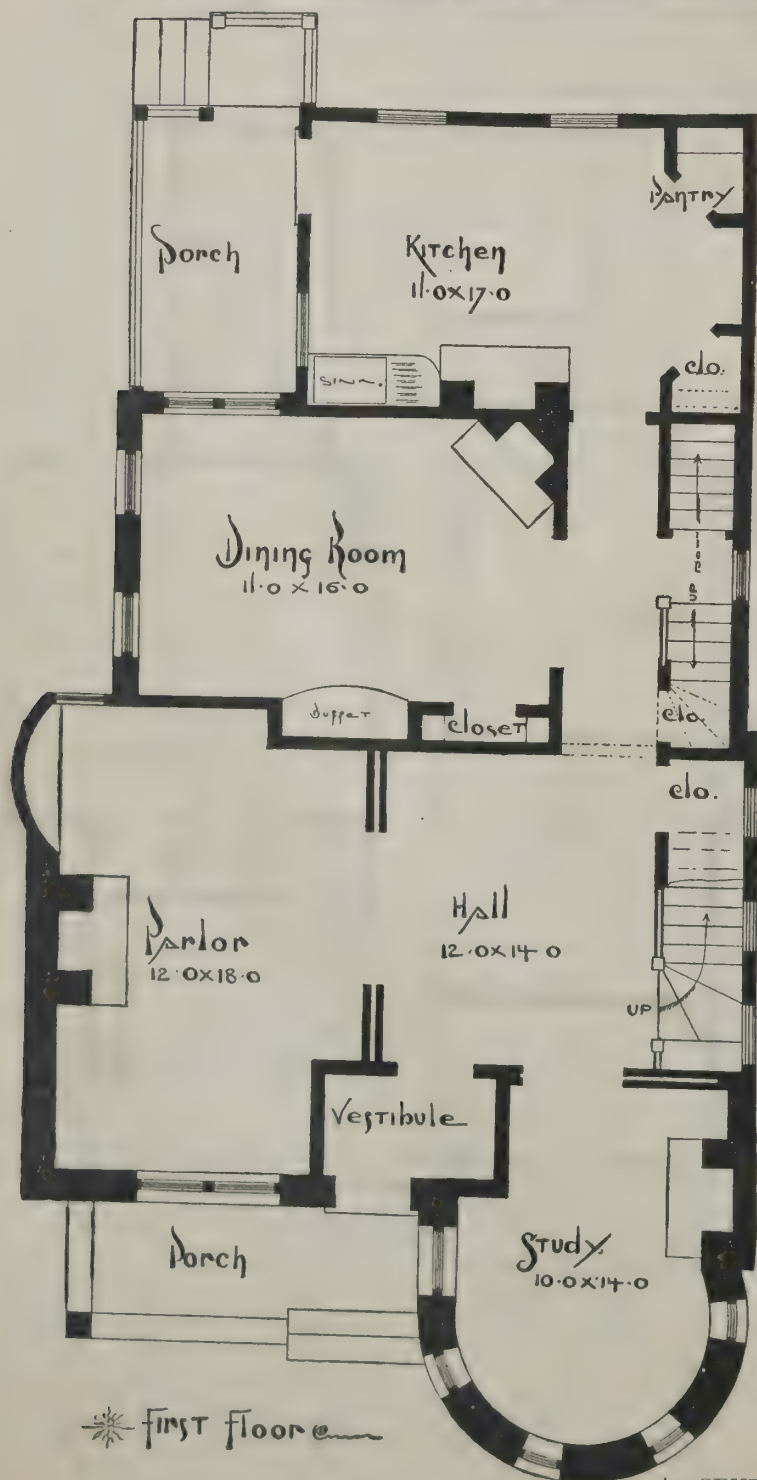
All the principal rooms have open fireplaces, with tile hearths, hardwood mantels and plate glass mirrors. The hall, parlor, and music room are separated by sliding doors. The ceilings are neatly corniced and have center pieces.

The hat and coat closet in hall the china closet, in dining room, and the butler's pantry are provided with drawers, shelves, and cupboards complete.

On the second floor are four good sized bedrooms and

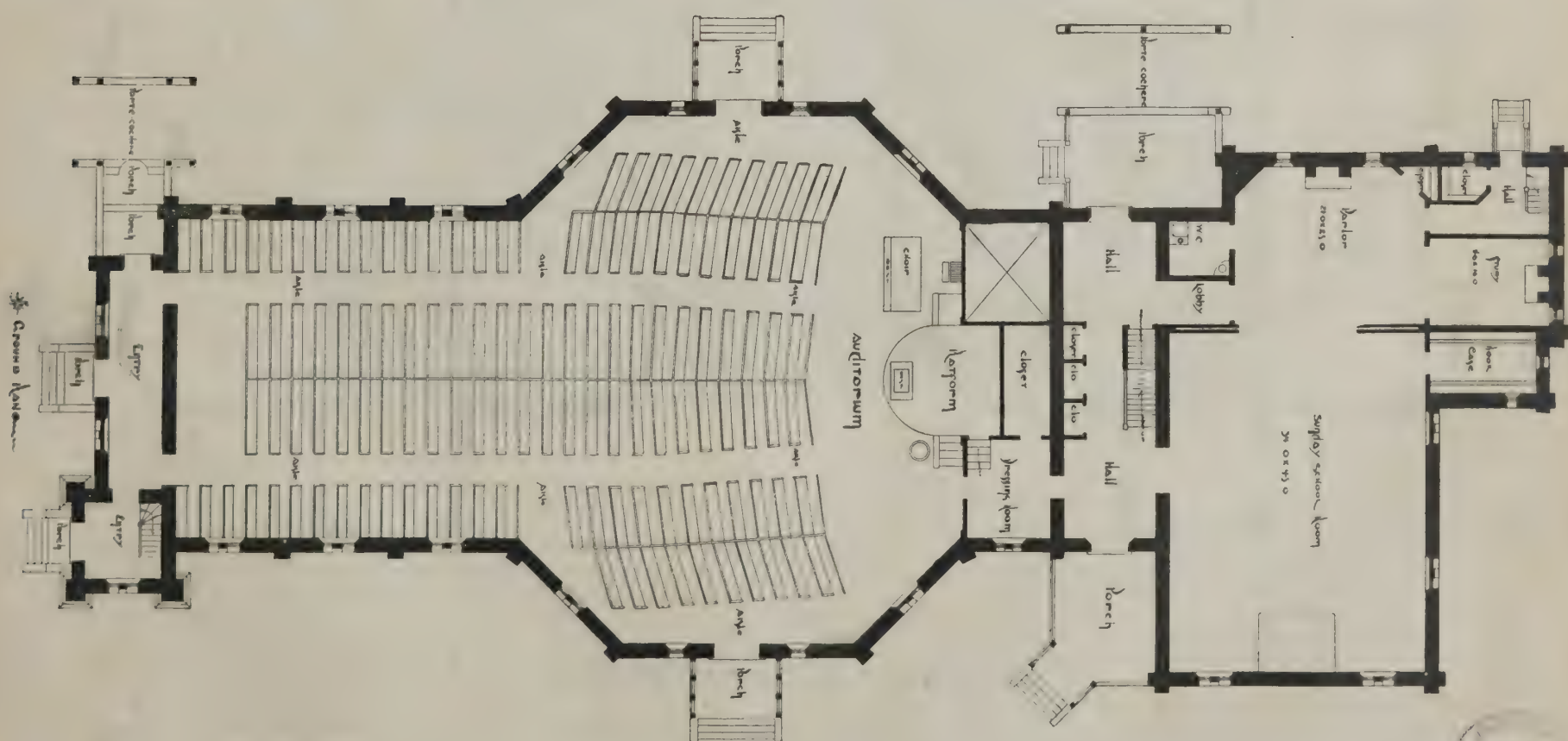


A RESIDENCE AT ROSEVILLE.



A SEVEN THOUSAND DOLLAR COTTAGE.

STON
BLIC
ARY



THE ORANGE VALLEY CHURCH.

[For description see page 64.]

A RESIDENCE AT FORDHAM HEIGHTS.

The house is upon Sedgwick Ave., at an elevation of about 200 feet above Harlem River. The foundation and first story walls are built of local rock (blue); second story frame, faced outside with red Vermont slate; roofs of Pennsylvania black slate; has a frontage

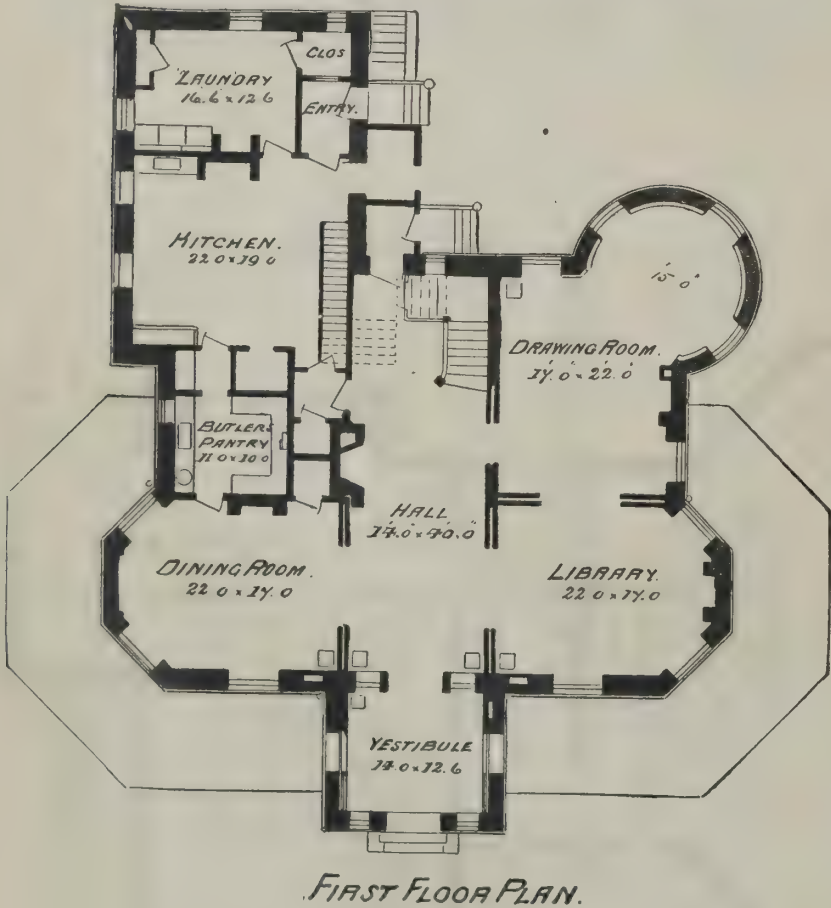
THE ORANGE VALLEY CHURCH.

Our engraving on page 63, representing a perspective of the Orange Valley Church, was made direct from a photograph of the edifice taken especially for the SCIENTIFIC AMERICAN.

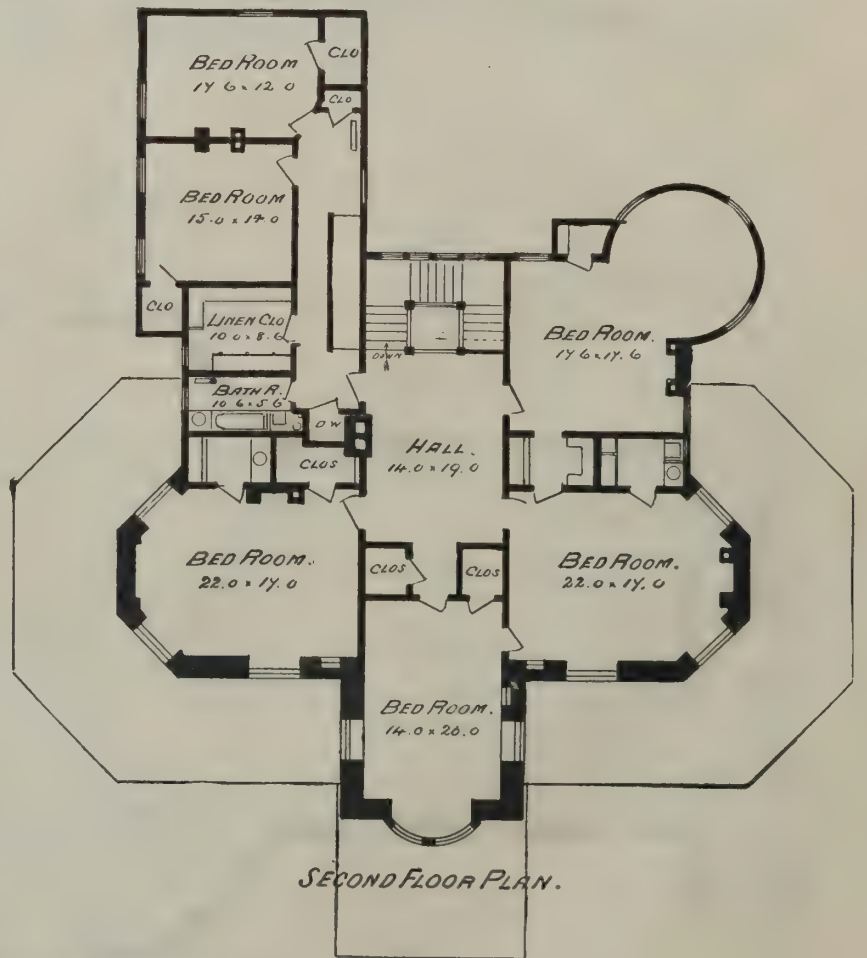
This church is located on Highland Avenue, at Or-

It is wainscoted with narrow beaded stuff three feet high, and above this the wall is lathed and plastered, and the timbers dressed and chamfered. The ceiling has a heavy cornice along the line of plate, and a moulding is run at angles of the intersection of ceiling. This wall is handsomely frescoed, and all the wood-

House for --
E.E. Eames, Esq.
Fordham Heights, N.Y.



FIRST FLOOR PLAN.



SECOND FLOOR PLAN.

A RESIDENCE AT FORDHAM HEIGHTS.

of 64 feet, by a depth of about 80 feet; is handsomely trimmed throughout interior with natural woods, paneled wainscoting, some hard-wood floors, and rich stained glass in hall and stairway. It is provided with the best plumbing and steam heating apparatus, also gas, with electric attachments. The hall chimney piece is about nine feet in width, with ample fireplace. Antique oak and cherry have been largely used in the trimming. The cost was about \$34,000. James Stroud, architect.

ange, New Jersey, from designs by the late Charles Duggin, architect, of New York.

There is a cellar under the building, with a foundation wall built of trap rock. The walls above foundation are also of trap rock, laid at random. The window sills, caps, and arches are of close-grained brownstone; the steps and platforms to the different porches are also of brown sandstone, rubbed.

The auditorium is 115 feet in length, with a maximum width of 70 feet, and a seating capacity of 800 persons.

work is painted in tints, except the inclosure to organ, dressing room, and platform, these being built of black walnut paneled.

There is a balcony over entry with a seating capacity of fifty persons.

The ground floor is deafered with a cement floor laid under same, between joists, 2" thick.

The dressing room has large closet, and at the rear of this dressing room is a main hall that runs through, with entrance at either end, and in the center are three

closets, opposite to which are stairs that lead to cellar and to Sunday-school room over parlor. The main Sunday-school room or chapel is 34' x 45', and is separated from parlor by double sliding doors. The library is fitted up with book cases on either side. The parlor is 21' x 25', and is well lighted. There is a closet at one end, and opposite is a toilet room. The study at rear of this parlor has an open fireplace.

In the rear hall are stairs leading to Sunday-school room.

The windows throughout are glazed with stained glass, and a furnace in cellar provides the heat.

The expense of all the structures above described is stated to have been \$60,000 complete.

TRINITY CHURCH, DENVER.

We give herewith from the *Denver Journal of Commerce* a perspective view of the new Trinity Methodist Episcopal Church at Denver, Colorado. It is an elegant structure, and reflects much credit on the architect, Mr. Robert S. Roeschlaub, of Denver.

Crushing of Masonry.

Crushing of material is a subject that necessarily comes under the architect's observation. In 1848 the columns of a new church were formed of chalk; this was, of course, the gray chalk, which is a sound, homogeneous material, and, if kept dry, will sustain a good weight, but in this case wet got to it and some frost, and it went to pieces. It seems to me that when we look at the adverse conditions to which building operations are exposed, it is scarcely wise to use so absorbent and so light a material for bearing purposes. Some kinds of chalk are not unfit for other uses in a building, and a good application of it for ornamental work may be seen in the restoration of St. Cross Church, at Winchester. In the case of a Bath stone column in a modern building, from which sprang four arches, it failed from crushing, or rather it was from breakage. The shaft was a cylinder of 2 feet 3 inches in diameter upon a base 3 feet 3 inches square, and it was the moulded base stone that broke. The weight on the column was about 68 tons, that being 17 tons per square foot, which is less than one-third of the smallest weight that is sufficient for crushing according to experiments, which have shown that it takes at least 54 tons per square foot to crush good Bath stone. The discovery of the failure was made soon after the building had been roofed in, and all was in very perilous condition, inasmuch as, if this shaft had come down, nearly the whole building would have followed. The stone that broke was the one used at the ceremony of what is called laying the first stone. It was 1 foot 6 inches thick and 3 feet 3 inches square, and in the center of the stone beneath it was a small hollow for a bottle of coins, so that there was no bearing in the immediate heart of the work; but the failure was not caused by this, but by the improper manner in which the stone was bedded by a noble personage, or rather I should say by the masons who prepared the bedding for his lordship. The foreman thought he must have the mortar peculiarly smooth and good-looking, which was an error to begin with; he then put four stout patches of it on the lower stone, one near each of the four corners, where it got somewhat dry during the time consumed by the ceremonial; and after that time some fine liquid mortar, very much like grout, was put over the general surface, and his lordship troweled it about, but the four patches were not flattened down nor made homogeneous with the other mortar, yet the stone was then lowered, leaving the four patches as the most

solid portions. All stood well for nearly a twelve-month, until the entire weight came on, and then cracks were observed. There is abundant evidence in both ancient and modern works of the defective mode in which the materials of walls are put together, and though this may be of comparatively slight importance when the walls have not much duty beyond that of being the inclosures of buildings, yet when they have to sustain great weights or thrusts it becomes of paramount importance that their materials be well applied and united, and this fact seems scarcely to have been fully appreciated since the best days of the Greeks and Romans. The crushing of the piers carrying the dome of the Pantheon at Paris is a most instructive warning under this head, and, while deploring the occurrence, we cannot but admire the remarkable mechanical talent displayed by Rondelet in the restoration of them, and the book that was published on the subject is well

The Oldest Architectural Drawing.

A plan of the monastery of St. Gall is now preserved in the library of that establishment. It was first published by Keller, at Zurich, in 1844, and republished two-fifths the real size in the *Archæological Journal*, p. 87, vol. v., with a most excellent notice by Professor Willis. The plan, which is drawn in thin red lines upon a large sheet of parchment, with inscriptions all over it, showing the uses of the different parts of the building, was sent, as one of the said inscriptions informs us, for the use of the Abbot Gospertus (who began to rebuild the church and monastery in 829), by some anonymous friend, who is supposed with some reason to have been Eginhard, the son-in-law of Charlemagne, who held the office of prefect of the royal buildings. However this may be, the plan presents us with a very complete monastery, with its great church and accompanying buildings. The red line not only serves to mark the

external and party walls, but also to indicate the furniture, such as benches, tables, stoves, etc., requisite to each building. The plan, as Professor Willis very properly remarks, is not done to scale, but certain figured measurements enable us to form some idea of the size of the buildings. The church would appear to have been a most noble structure, with two apses and three paradises or semicircular walks. The western one was further enriched with two circular towers. The winding stairs of these latter are shown as gradually winding round from the circumference to the center, like a section of a snail-shell. It is doubtful whether a common winding staircase is thus represented, or whether it was really an inclined plane, which went from the circumference to the center, and so on to an upper chamber, where there was an altar, in the one case dedicated to St. Michael and the other to St. Gabriel; there would, supposing the latter supposition to be correct, be room to hang the bells in the space between the newel and circumference in the upper part of the tower. The ornamental finial at the top is shown on plan as finishing the newel. The arches of the cloisters and the crosses of the altars are shown in elevation on their respective places on the plans, a mode which still obtains in Turkey at the present day, even among the distinguished native architects who have the honor of working for his Imperial Majesty the Sultan, so little have things changed in the East. Another peculiarity in this St. Gall plan is that sundry squares are drawn in the middle of courtyards and of buildings. These, as Professor Willis sug-

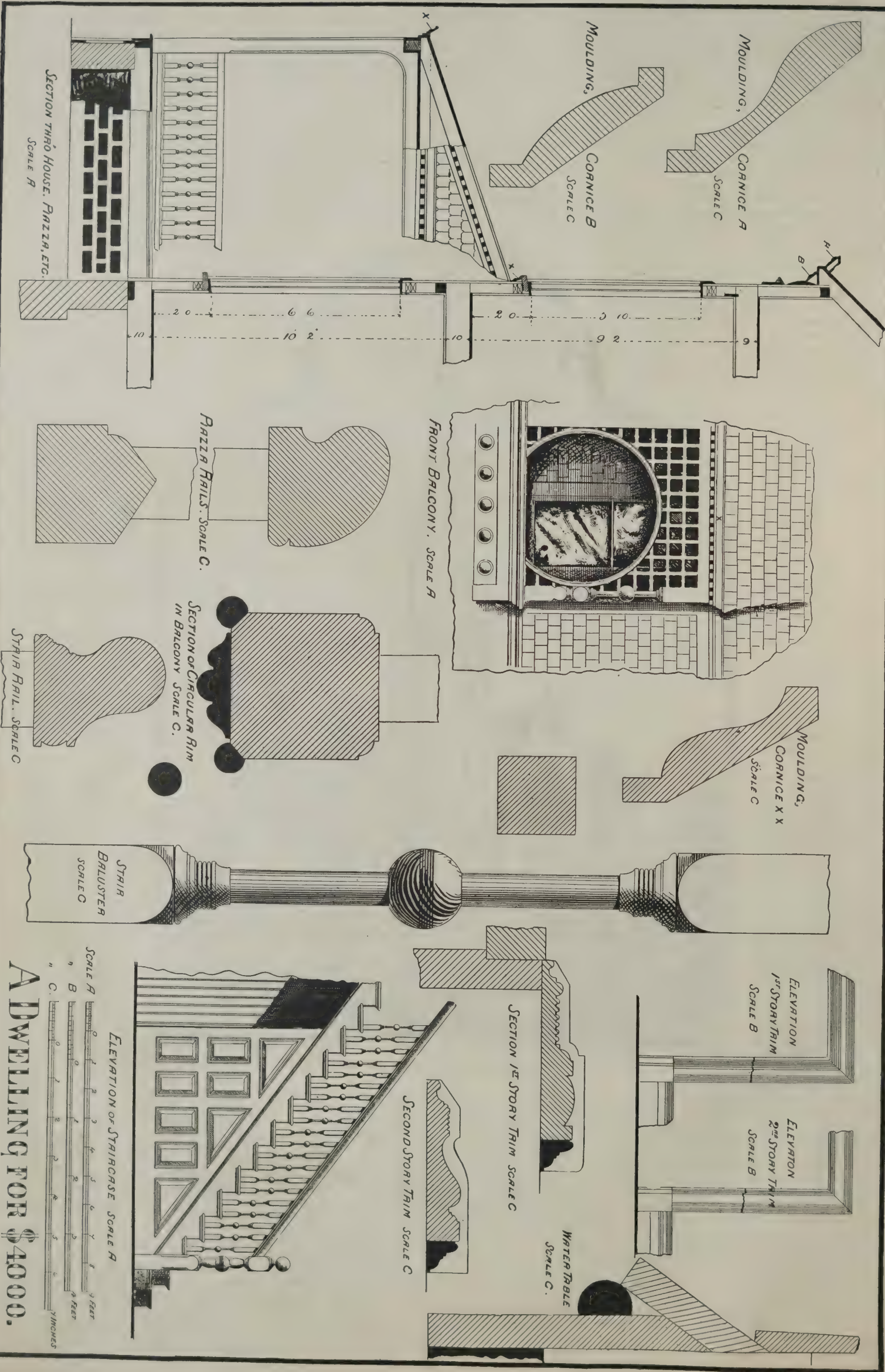
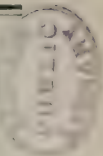


THE NEW TRINITY METHODIST EPISCOPAL CHURCH, DENVER, COLORADO.

worthy of study; but the chief defect that I wish to allude to is the absence of that uniformity in the horizontal strata of walls which the word "homogeneous" most expressively indicates, and of which defect the tambour wall under the dome of St. Peter at Rome is a notable example. In a rapid age like the present it is not likely that this homogeneity or similarity of material through the whole thickness of the wall will be thoroughly attended to. I will note a small matter that is slightly connected with the point, namely, that in buildings even of considerable excellence the water tables of buttresses often break away from the body of the buttress, especially when the bulk of the work is of rough stone; this irregular settlement shows that the dressed stone being more compactly laid than the rough stone, the two do not harmoniously blend, and that a more thorough bonding is needful, by using longer alternate stones than is customary, and it also suggests the idea that buttresses may have too great a projection, inasmuch as the outer part may not catch the due influence of the weight.—E. Nash.

gests, might be either indications of the classic atrium with its uncovered impluvium, or a sort of upper lantern rising above the roof and giving light by means of clerestory windows. Both these explanations are very feasible, and both probably were intended in the original. Lastly, Eginhard, or whoever was the architect, wrote certain explanations in Latin verses on various parts of the drawing. Fancy that most matter-of-fact production, a modern plan, ornamented with metrical directions to the builder!—W. Burges.

FULL plans, specifications, and details ready for the builder, of any of the houses illustrated in this publication, may be had on moderate terms at this office. Special plans and specifications for the erection of buildings of all grades are also supplied by us. Munn & Co., architects, 361 Broadway, New York. Plans for the alteration and enlargement or improvement of buildings are also supplied.



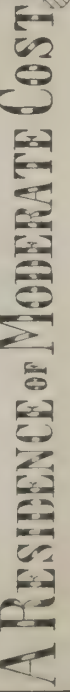
ELEVATION OF STAIRCASE SCALE A

SCALE A
0 1 2 3 4 5 6 7 8 9 FEET

SCALE B
0 1 2 3 4 5 6 7 8 9 FEET

SCALE C
0 1 2 3 4 5 6 7 8 9 FEET

A DWELLING FOR \$4000.



Mahogany.

Mahogany is a prince among woods! And why? Not alone for its beauty (that would make it a princess), for its durability, its freedom from atmospheric influence, the permanence of its brilliancy, and the unequalled grace of its grain. I cannot understand how any rich man, with the desire to have his house artistic as well as elaborate, can lose sight of the enormous advantages possessed by mahogany, if only in its decorative phase.

Let me, briefly, revert to the process of preparing this wood for practical use in the construction of wain-

scotings, furniture, and the numerous other purposes to which it is applied. My excuse for this is that the comprehension, even superficial, of how and why certain things are done often gives them a much brighter complexion and an entirely different aspect.

When the enormous logs are landed from the numerous points whence mahogany originates, they are carefully examined by an expert, and those promising the showiest and most elaborate grain are marked with a cross upon either end. I say an "expert," for it requires an experienced eye to distinguish a difference, and especially an advantage, in the forbidding exterior of the ill-shaped masses lying about the yard. The ordinary observer would find it difficult to muster sufficient imaginations to discover in this raw condition the beautiful results that follow the lead of a saw and chisel.

The popular application of any wood is in the form of veneer, and to produce veneer is very different in mahogany than in the multitude of other lumber. It is brought forth by a delicate circular saw or by a gigantic razor. The first rips off the thin slices, the latter shaves it off. With the saw the life of the wood is preserved, its vitality is retained, it has a freshness when it comes from the crisp cut that makes it appear rich and bright without further manipulation. The slicing or shaving, however, has a somewhat different effect. In order to soften the tough wood, that the knife may plunge into it without producing the ragged edge of a rough, uncouth incision, a volume of steam is thrown upon the log, and the shaving comes forth from the keen edge, curled and smoking. This unavoidably kills, or at least wounds, the freshness of the veneer's beauty, as it requires no preternaturally quick eye to discover.

In its natural condition, as the wood comes from the saw, whether it be in the delicate veneer or in cumbersome planks, it is light in color, and has a richness that nature invariably bestows in some measure to the most ordinary of her products, and defies the keenest effort of art to successfully imitate. Finished in this condition, varnished in the shade and tone of its growth, mahogany can have no competitor in the taste and fancy of men, for it is infinitely above and unapproachably beyond any other decorative material extant.

And right here is where the unsuspecting householder has been deceived. Instead of resting satisfied with the innate beauty of the wood, injudicious manufacturers have stained it, darkened it, muddled it; in other words, robbed it of its sparkle, and given it a heavy, funereal semblance that is foreign to it, and therefore disfiguring. And why has that been done? Solely so as to make it possible for whitewood, maple, birch, and anything that may come that way to be

dyed and painted to the same color that mahogany has been artificially brought; where both are stained, the false is not so readily discovered.—A. Curtis, *Decorator and Furnisher*.

Flexible Foundations.

The ordinary conception of a foundation is that its virtue is in exact proportion to its rigidity, and that the more unyielding it is, the better it serves its purpose. And while this assumption may be true in supporting a heavy load, yet where questions of impact enter, the "soft answer will turn away wrath," as

building in New York gave a great deal of annoyance to the occupants by the jar which was transmitted throughout the building. It is supposed that the motion of the engine was in rhythm with the key note of the building. The makers of several engines tried to solve the problem, which was at last achieved by one firm, who bolted the bed of their engine to a timber raft which rested upon a layer of hair felt such as is used for non-conducting coverings for steam pipes and boilers, but 14 in. thick. This felt was placed upon the masonry foundation recently prepared for the engine, and surrounded by a heavy timber box which prevented

its spreading. An engine used to operate the electric light plant in one of the principal hotels in New York City gave annoyance to the guests because, when it was in operation, beats could be heard all over the building, notwithstanding that the engine was situated in a tightly closed room in the basement. After various other expedients had failed, the doors to this room were taken down and replaced by double thicknesses of carpet fixed upon the framework. This served to break up the rhythm in such a way that the sound was not heard throughout the building. Sawdust has been used for foundations in many instances, and there are numerous towns in the United States which have been built up from small villages originally around a sawmill, and the sawdust from the mill has been used to fill up low places which have afterward served as building lots. In course of time such filling becomes very compact, and does not appear to waste by decay.—*Engineering*.

WALL PAPER DECORATIONS.

Messrs. Jeffrey & Co. have just published an exceedingly novel folio in illustration of what they term "The Victorian series" of designs. In this publication the various patterns are arranged after the fashion of a folding screen, which shuts like a book, and reads both ways, so that room is obtained for a double number of examples. These have been reduced by photo-lithography from the actual papers, and are shown to scale, giving at a glance the general effect of the design illustrated. Of course without actual specimens of the papers to be used, reduced copies like these before us may possibly be misused; but, anyway, they give a complete idea of how the pattern groups itself over a surface, and whether the repeats supply tiresome combinations or not. A small piece

of a pattern may be extremely nice, but when multiplied an endless number of times over a wall, its restlessness may assert an overpowering effect, and be simply unbearable. Another advantage of these reduced copies is the comprehensive idea they afford of large patterns, enabling the intending purchaser to judge how they fill spaces and will cut up for friezes or staircases; and experience has taught us that large, broadly treated patterns, even for small apartments, if well chosen, are by far the most effective, and certainly do not make little rooms look smaller, as some have contended. We now illustrate one such pattern by Mr. Lewis F. Day, called the "Arabesque Panel Decoration." Mr. A. F. Brophy's "Flower Scroll" paper, of which we give an illustration, makes one of the most successful wall patterns for staircases that we know of; and having used it, we can say how well it fills almost any space, without tiresome effects, beginning nowhere and ending



FLOWER SCROLL—DESIGNED BY A. F. BROPHY.



STRAP CEILING—DESIGNED BY G. A. AUDSLEY.

well in dynamics as in polemics. At a factory in the United States some beveled gears which were used to change the direction of main shafting from one mill to another were at the end of very heavy shafts, which ran in pillow blocks, simply bolted to an outcropping ledge, which was dressed to a level for the purpose of sustaining the foundations. Some of the teeth of these beveled gears would break from time to time, and in a most unaccountable manner. The accident might be deferred for three months, or it might occur at any moment. Various expedients were tried, and finally that of taking up the pillow blocks and placing them on seats of raw hide which had been soaked in oil; these gave the bearings enough elasticity to prevent a concentration of shocks upon the teeth of the gear, and in that way acted as a buffer preventing the gears from committing a mechanical suicide. A steam engine used to operate the dynamos for lighting an insurance

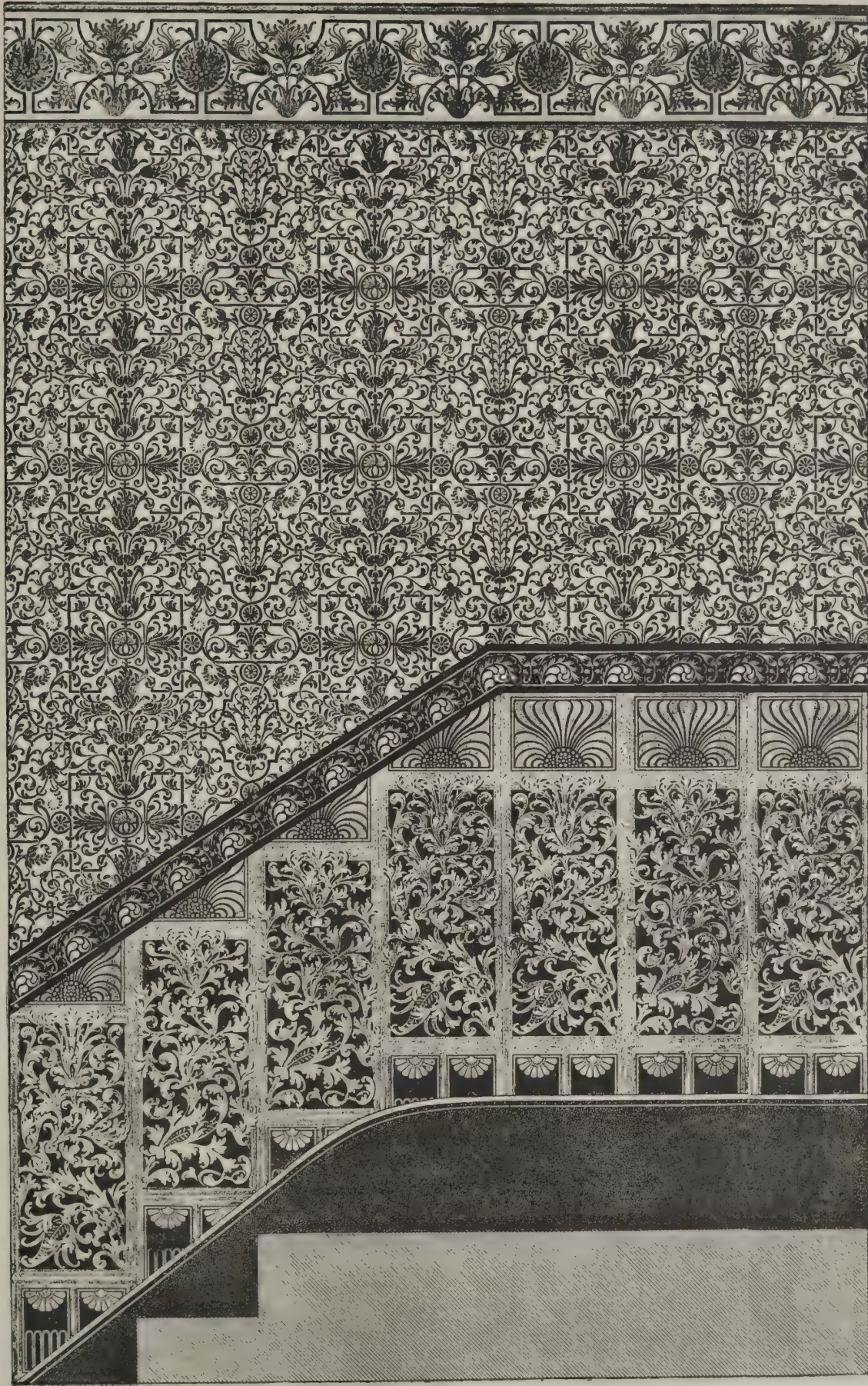
anywhere; it makes a very useful paper, marked by good drawing and design. Of ceiling papers, Messrs. Jeffrey have many makes, and it is difficult to single out any for special praise. We give one, designed by Mr. G. A. Audsley, called the "Strap" pattern, and which seems eminently suitable for flat-surfaced ceilings. As a rule, papers for such a position are either too small and ineffective or too big and self-assertive, trying to imitate plaster ribs and paneling, whereas a good paper should carry the eye over the ceiling as a plastered surface, recognizing that its sole object is to give a decorative effect of a very elementary order only.—*Building News, London.*

Treatment of the Ceiling.

The most usual form of ceilings in the classic era, where the spans were great, continued for a long time to be the vault. The remains at Pompeii, and indeed of Roman art over all Europe, show that the semi-cylindrical vault was the customary mode of construction, often varied, however, by groining. The diagonal lines of this cross vaulting were usually executed by Roman builders in a careful way with well jointed masonry or brickwork, the spandrels being filled in with a more rudely worked and lighter material.

It was from this particular mode of workmanship that mediæval vaulting was derived: the more solid diagonals becoming still more visibly and strongly pronounced, first appearing as square ribs, and ultimately assuming the more familiar aspect of ribbed vaulting; the spaces between the ribs being built, as in the Pantheon and other Roman buildings, with sometimes volcanic scoria, and sometimes tufa. So in mediæval buildings—as at Glastonbury and elsewhere—a sort of calcareous tufa, and still more commonly of chalk, was used. It is not, however, to be forgotten that during the whole of these periods, from the Greek era and earlier downward, flat ceilings of timber may have never ceased to be formed, although their perishable nature has deprived us of existing examples. We read in Homeric buildings of beams painted in bright colors, and even incased in plates of ornamental metal work; but we can now trace only indications of their existence in the apertures left in the masonry for their reception. In later classic times representations of flat timber ceilings occur not unfrequently in frescoes. In the fifteenth century—by far the most actively inventive period of modern art—Italian architects contrived an entirely novel form of ceiling, for which neither classical nor mediæval art had furnished the slightest precedent. They reconciled the convenient form of the flat ceiling to the equally familiar but more elegant form of the vaulted ceiling, by uniting with the former a deep cove, or half-vault, springing from the walls. This was first executed in wood—the earliest examples of which, so far as I know, occur at Venice, as at the Academy. But afterward these coves came to be formed in plaster—a mode of construction that hardly can date earlier than the beginning of the sixteenth century. It must be admitted that there is a want of truth in this coved form of ceiling, for which the only plea in justification is the very pleasing mode it affords of obviating the heavy depressed appearance of a flat ceiling. Attempts were made, it is true, to obtain, in a more truthful mode of construction, somewhat the same effect, by turning in masonry an extremely flat

elliptical vault. But Sansovino, who ventured this expedient in the Libreria at Venice, was thrown into prison and fined 1,000 scudi for his failure—a fate which must have powerfully operated on the minds of his brother artists in overcoming their scruples about plaster coves. Another mode of forming ceilings which was much practiced by early Italian artists was to frame them of deep coffers wholly of wood, often richly painted and gilt. There are few palatial apartments within my own knowledge equal in grandeur of effect to the magnificent halls (now in a melancholy state of decay) of the palace built at Mantua by Giulio Romano.



ARABESQUE PANEL DECORATION—PAPER FOR STAIRCASES—DESIGNED BY LEWIS F. DAY.

The ceilings are for the most part so constructed, and the gigantic force of their coffers, relieved by the extreme richness of their carving, proclaims the master hand of the great artist who designed them. At Venice, and at the Farnese palace at Rome, we have also very noble examples of this form of ceiling. In the nearly contemporary flat coffered ceilings executed in England by Holbein, as in the Chapel Royal, St. James', and probably by the same master in the Savoy Chapel, we have ceilings designed on the same principle, although but weak and faint imitations, yet even these are almost bold when compared with the ceilings lineally descended from them in later times. The Stuccatori of the last century discarded this coffered ceiling, and introduced a style of decoration better suited to their special material; until, toward the close of the century, their art in its turn succumbed and gave way to plaster castings of the feeblest kind.—*S. Smirke.*

tions in harbors dangerous to navigation. So far, the most successful defense against the teredo is the creosoting treatment for timber.—*Northwestern Lumberman.*

The Tereido.

An article in the *Atlanta Constitution* upon the teredo, the salt-water borer, which honeycombs ship timber, piles, or any wooden structure exposed to its attacks, is full of interest. Its habitat, it is stated, was originally in the tropic seas, but it was readily carried in the timbers of vessels into North American or European waters. It will bore through a piece of timber until it becomes a mere shell and collapses under the weight it supports. A peculiarity of the teredo is that it bores and feeds itself with what is regarded its food, while at the opposite end it has two heads. It is difficult to understand where this seemingly frail creature gets its astonishing power. There are in the *Northwestern Lumberman* office several specimens of piles eaten through by the teredo which exhibit a peculiarity detailed in the *Constitution's* article. While the interior of the timber is filled with perforations running with the length, and intersecting each other in various ways, no holes appear upon the circumference, except very small ones, while those inside are from one-fourth to five-eighths of an inch in diameter. The question naturally arises, How does the teredo get in, and does it ever make its exit? The explanation is that when young and small the borers fasten themselves to a round and generally new pile by means of a suction apparatus in their heads, and bore inwardly with the foot until only the head remains outside. Then they fasten themselves to the very edge, and bore and grow. Entering at an aperture of the diameter of a darning needle, they work away until they fill a channel up to an inch across. The worm usually reaches a length of from one to three feet, but is said to attain a diameter of two inches and a length of fifteen feet on the Pacific coast, although so far as is known its only food is the sawdust it makes. It is told that instead of crawling inward and onward as their burrowings lengthen, the borers simply grow in due proportion, the head remaining in its place. Their size thus increased, and the log once consumed and broken off, they fall a prey to the fish. The teredo lives and dies with his log. It never attacks floating timber, but a ship riding at anchor with her timbers unprotected by metal sheathings is easy prey, and soon destroyed. Wharfs are often sunken by the destruction of supporting timbers by the teredo. The good it accomplishes is by boring into and disintegrating sunken wrecks, timbers, and other obstructions in harbors dangerous to navigation. So far, the most successful defense against the teredo is the creosoting treatment for timber.—*Northwestern Lumberman.*

The Oldest Timber.

Probably the oldest timber in the world which has been subjected to the use of man is that found in the ancient temple of Egypt, in connection with stone work, which is known to be at least four thousand years old. This, the only wood used in the construction of the temple, is in the form of ties, holding the end of one stone to another. When two blocks were laid in place, an excavation about an inch deep was made in each block, in which a tie, shaped like an hour glass, was driven. It is, therefore, very difficult to force any stone from its position. The ties appear to have been of the timarisk or shittim wood, of which the ark was constructed.—*Globe.*

A CARRIAGE HOUSE.

We give a perspective from a photograph, also floor plan, of an attractive carriage house in the "Queen Anne" style. The underpinning of brick, first story covered with clapboarding, roof shingled and painted red.

The main floor is ceiled with narrow beaded North Carolina pine, oiled. Accommodates four carriages, and stable contains a single stall, box stall, and a cow stall. These stalls are fitted in the usual way, iron mangers and hayracks, stalls well lighted and ventilated.

Harness case fitted up in the usual way; there is a chimney supported over harness closet; man's room in second story, and ample storage room for hay and feed, etc. Cost \$950.

Compressive Strength of Bricks and Piers.

The results obtained by the Watertown experiments on the compressive strength of cements and mortars are instructive. The compressive tests of three kinds of bricks are of interest. 1. The hard-burned face bricks from North Cambridge, Mass., showed an average crushing pressure of 13,925 lb. per square inch; the average at which flaking off occurred was 7,100 lb. per square inch. 2. Thin hard-burned common bricks flaked at an average pressure of 8,800 lb. per square inch, and crushed at an average of 18,337 lb. 3. The Bay State medium bricks from Cambridge and Boston flaked at an average of 6,620 lb., crushing at an average of 11,406 lb. Flaking occurred generally at about 5,000 lb. pressure.

Passing over the cement tests, we come to the record of brick piers. The bricks were laid on the bed, joints broken. The highest resistance was shown by piers laid in Portland cement. The experiments go to show that, when lime mortar is used, the yielding chiefly took place in the joints. Cracks first appeared at the surfaces of the piers. Snapping sounds were heard long before the cracks appeared, in one case at 200 lb., in another at 300 lb., in others at 400 lb. and 500 lb. per square inch. In one case the sound was heard after 1,800 lb. was tried, and the average at which it occurred is stated to be about 900 lb. It was found also that the second application of a load, after release from the first,

often caused an increase in the compression. The report continues: "The remarkable fact comes out by one of the experiments that under application of a lighter load after a heavier one, the set perceptibly diminishes, and this occurs quite near the load, causing rupture. For example, a pier 12 inches square, 73 inches high, gauged length 50 inches, gave at 139 lb. per square inch a total compression of 0.0103 inch, increasing in five

mortar being the same in both cases. With increase of age the resistance is found to be greater. The brick piers in lime mortar showed the important part played by the mortar. We have no room to analyze the tables appended to the committee's report, nor the series of diagrams representing the curves of pressure. Of course, these experiments give only approximate results. Further tests are to be made. For the architect the

pressures at which surface cracks or flaking off appear are those alone of any value as indicating the strength of piers. These cracks presuppose a certain amount of crushing of the mortar joints or brick, and therefore a settlement; added to which the usual vacuities in brick piers to buildings, and the want of evenness of pressure over the whole section of the pier, will be found to still further reduce the figures we have cited.—*Building News*.

Repetition of Ornament.

The more simple the ornament, not only should it be the more evenly distributed, but the more necessary it is that it should be repeated. A simple form which means nothing can be repeated without being tiresome. Representative ornament—such, for instance, as a leaf—is less adapted for repetition than a form which is purely ornamental, and represents nothing whatever. For this reason I have always admired the Doric and Ionic in preference to the Corinthian order of architecture, for orders imply repetition. The more nearly the elements of ornament approach the imitation of nature, the less are they adapted for repetition. The higher their or-

ganic rank, the less they ought to be repeated. A panel made up of curves and strapwork, however complex its construction, may be repeated over and over again without weariness; but if we introduced the human figure into the composition, it would, strictly speaking, be necessary to make a fresh design, at least in so far as the figures were concerned, for each panel. In the same way the more severe the style of a building, the more necessary is the repetition of all its parts, and consequently the elements of which the ornament is composed must not be imitated from nature, but must be simple and conventional.—*F. W. Moody*.



A CARRIAGE HOUSE.

minutes to 0.0109 inch. On release to 70 lb., the set measured 0.0065. At 348 lb., the compression was 0.0504, increasing as before to 0.0527. On release to 70 lb. the set was 0.0328, diminishing to 0.0327 in five minutes. Again at 556 lb. the compression was 0.0955, increasing to 0.0994. On release, as before, the set was 0.0653, after five minutes 0.0649, and after 65 minutes 0.0646. At 694 lb. the first crack appeared, and compression after five minutes was 0.1334, diminishing on release to 70 lb. to 0.0908, and after five minutes to 0.0902. Total failure occurred at 1,210 lb. per inch."

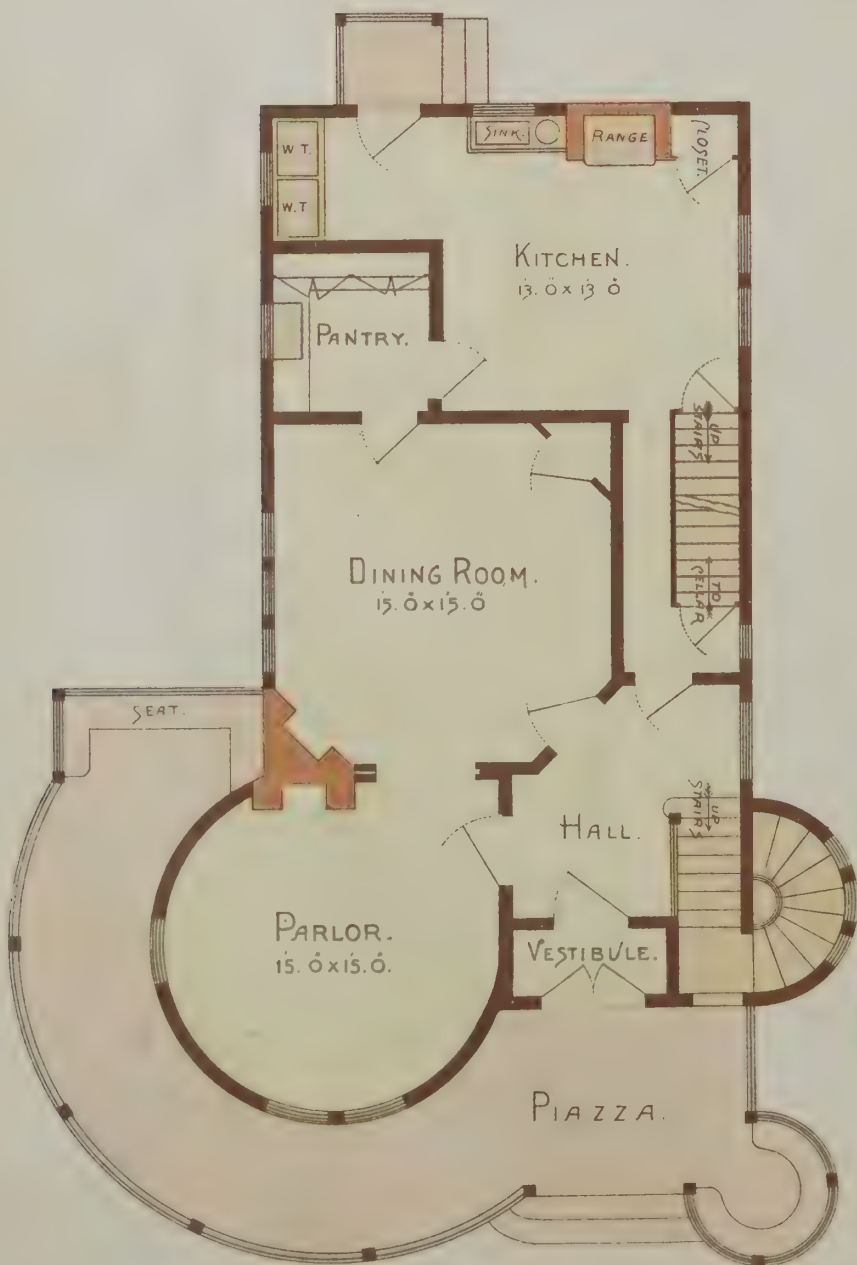
It was found also that hollow piers were of about the same strength as solid per inch of solid section, the



A CARRIAGE HOUSE.



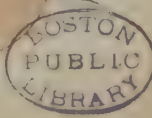
A RESIDENCE OF MODERATE COST.



FIRST FLOOR PLAN.

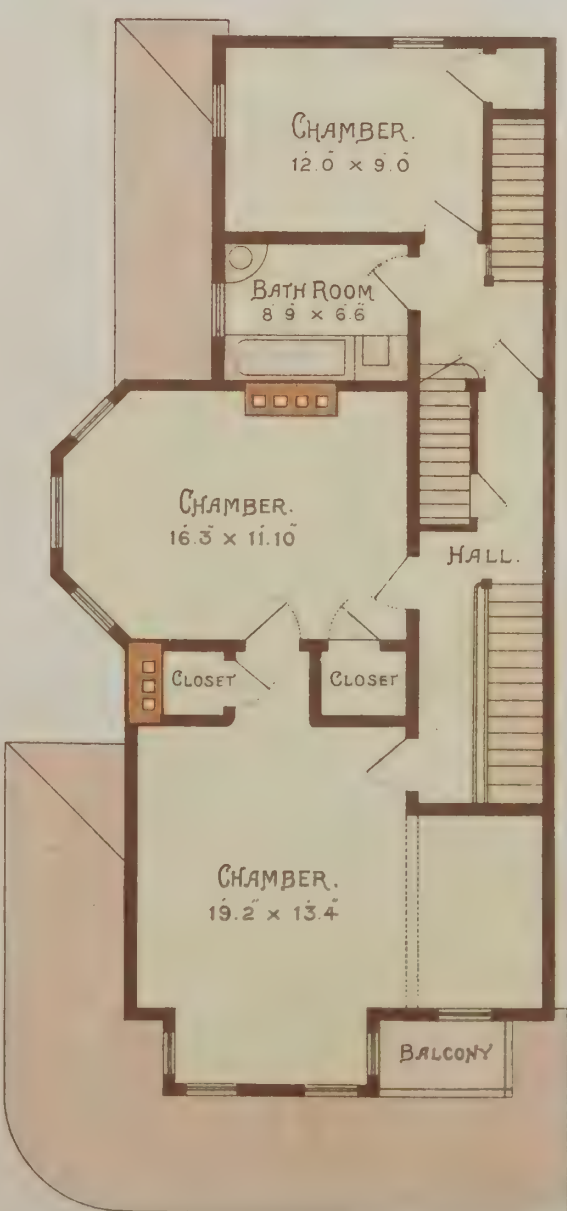


SECOND FLOOR PLAN.





A DWELLING FOR FOUR THOUSAND DOLLARS.

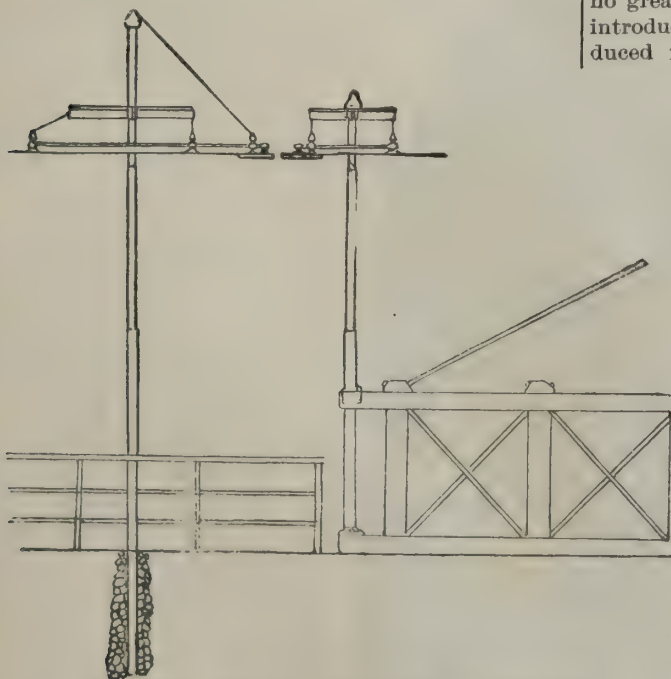


THE THOMSON-HOUSTON ELECTRIC SYSTEM FOR STREET RAILWAYS.

We present herewith a picture representing the operation of this system on the street railway between Boston and Cambridge, Mass. On November 20, the company began the equipment of the Cambridge division of the West End street railway, from Bowdoin Square, Boston, via Cambridge Street, West Boston Bridge and Main Street, to Harvard Square, Cambridge (three miles), and thence via North Avenue to Arlington, a distance of four miles, about six miles of the total distance being double track and paved. The overhead construction has been used throughout, the main conductors being suspended from cross wires attached to iron poles placed at a distance of one hundred feet apart. Three styles of poles were used, it being necessary to use stronger ones on the curves than on the straight stretches. These poles are made of lengths of iron pipe shrunk together, and present a very neat appearance.

The most important problem in connection with the construction of this line was the drawbridge over which the cars are compelled to pass; but the fact that the cars on either side of the draw operate as well when the draw is open as they do when it is closed, proves that the problem was practically solved by the company's engineers. The automatic switch used is shown in the accompanying cut. The short stretch of overhead wire on the draw is independent of the shore wires, and receives its current through an auxiliary cable, which is brought up to the center pier on which the drawbridge revolves. This cable is connected to that portion of the switch which is stationary on the pier. On the revolving part of the pier is suspended the other part of the switch, which is in turn connected to the short strip of overhead wire on the draw itself. When the draw is open the connection at the switch is broken, but this in no way interferes with the cars on either side, as the overhead circuit, and that through the rails, is completed through a cable which is entirely independent of the one running to the switch.

The rails on the draw are connected the same as those on the street, and four poles, one at each corner, hold the conductors in position. The overhead construction at each end of the draw and upon the bridge adjacent to these ends is of special design. At each



AUTOMATIC SWITCH USED OVER DRAWBRIDGE.

end of the conductors a length of iron pipe is used to secure rigidity. To this the curve ears are fastened, and at each end are fastened frogs, so that when the draw is closed these two frogs come together, thus rendering it impossible for the trolley to jump the wire in passing from the conductor on the bridge proper to that on the drawbridge.

The cars (twenty in number) are each equipped with

two 15 horse power Thomson-Houston motors, and tow an additional car. They are lighted by five incandescent lamps, and equipped with head lights. The West End Company at present has no power station of its own, but receives the current necessary to operate the cars from the station of the Cambridge Electric Light Company. The power plant consists of five 80 horse



ELECTRIC STREET RAILWAY BETWEEN BOSTON AND CAMBRIDGE, MASS.

power Thomson-Houston generators, with necessary switch board and appliances.

The first trip was made Saturday morning, February 16, and from two o'clock on Saturday afternoon, February 16, up to February 28, every schedule trip was made but 9 out of a total of 1,179. On some trips two hundred passengers were carried. The total number of passengers carried per day is about seven thousand.

Figuring on the usual mileage basis that a horse can make, it is said that the experience thus far with these motors has demonstrated that one electric car did the work of thirty-two horses. Mr. Hapgood, the superintendent, stated that he would not want to agree to maintain, as a regular thing, the work done by these seven electric cars with less than 212 horses.

AN EXCELLENT SYSTEM OF HEATING.

For a long time the hot water system of heating has been a favorite system in Canada, and certain it is that, if it has been a success in that cold climate, it should also be a great success in this country. Until late years no great attempt has been made tending toward its introduction here, but wherever it has been introduced it has proved so successful, and the heat obtained so pleasant, that it has risen in public favor very rapidly.

The system stands open to the atmosphere at all times through the expansion tank, so there is absolutely no pressure, excepting the bare weight of the water, on the apparatus at any time. The principle of circulation is simply that of the difference in specific gravity of hot and cold water.

A successful hot water radiator must favor natural circulation, that is to say, must be so constructed as to debar the possible existence of forcing, and, again, should have such form that as soon as the water has served its purpose and become cooled, it can immediately find easy egress through the return pipe.

An important feature of the system is its economy of fuel, while the system is so easily controlled that a uniform temperature can be secured at all times. Water, that

most rapid absorbent of heat, surrounds the fire pot on all sides, and no heat can be lost.

The Bundy is one of the best of hot water radiators, as it meets all the requirements mentioned above. It has an upper circulating chamber, and no diaphragms to check or impair the circulation. It is a positive circulating radiator, and is made in a great variety of styles.

The manufacturers, the H. A. Griffing Iron Co., Communipaw Avenue, Jersey City, N. J., have one of the largest and best equipped plants in the country, which is devoted exclusively to the manufacture of their Bundy steam and hot water radiators.

Special attention is given to the manufacture of radiators with appropriate designs for Arabesque, Renaissance, Moorish, Oriental, and Queen Anne rooms, and parties interested in the subject of heating would do well to consult with them before placing their orders.

The Ball High Speed Engine.

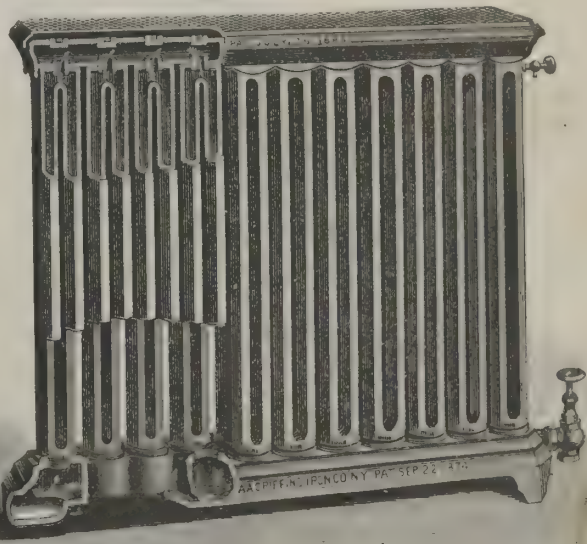
The Ball Engine Co., Erie, Pa., have lately issued a very complete catalogue of their high speed, automatic cut-off engines. These engines are but to be seen running to make friends. The engines manufactured by this company may be seen in many establishments of the principal electric companies of the country.

The Human Breath a Poison.

The Paris correspondent of the *Medical Press and Circular* reports that, at the last meeting of the Academie des Sciences, Professor Brown-Sequard referred to some experiments he had conducted with a view to determine what, if any, were the toxic effects of the human breath. In condensing the

watery vapor coming from the human lungs, he obtained a poisonous liquid capable of producing almost immediate death. This poison is an alkaloid (organic), and not a microbe or series of microbes, as might have been imagined. He injected this liquid under the skin of a rabbit, and the effect was speedily mortal. The animal died without convulsions; the heart and large vessels were engorged with reddish blood, contrary to what is observed after ordinary death, when the quality of blood is moderate and of dark color. In conclusion, this eminent physiologist said that it was fully proved that expired air contained a volatile toxic principle far more dangerous than the carbonic acid which was also one of its constituents, and that the human breath, as well as that of animals, contained a highly poisonous agent.

In connection with the publication of the BUILDING EDITION of the SCIENTIFIC AMERICAN, Messrs. Munn & Co. furnish plans and specifications for buildings of every kind, including Stores, Dwellings, Carriage Houses, Barns, etc. In this work they are assisted by able and experienced architects. Full plans, details, and specifications for the various buildings illustrated



THE BUNDY STEAM AND HOT WATER RADIATOR.

in this paper can be supplied. Those who contemplate building, or who wish to alter, improve, extend, or add to existing buildings, whether wings, porches, bay windows, or attic rooms, are invited to communicate with the undersigned. Our work extends to all parts of the country. Estimates, plans, and drawings promptly prepared. Terms moderate. Munn & Co., 361 Broadway, New York.

BEADING, RABBET, SLITTING, AND MATCHING PLANE.

The tool herewith illustrated comprises enough single tools, as known in old times, to half fill a tool chest. It will work in all the lines which its name indicates;

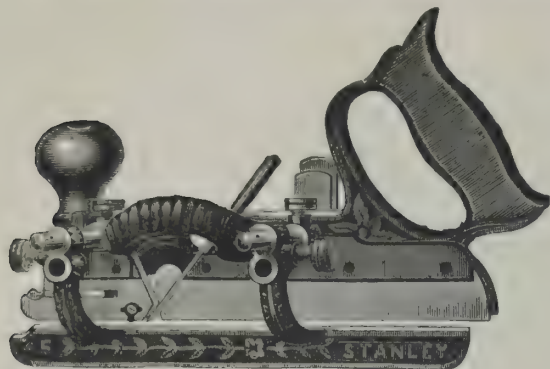


Fig. 1.

and as it is constructed of metal, it is always accurate, not being subject to warping or shrinking.

The illustration, Fig. 2, represents a few samples of the eighteen bits, etc., that go with the tool, thoroughly furnishing the workman for doing every variety of work in the way of beading, rabbeting, slitting, or matching.

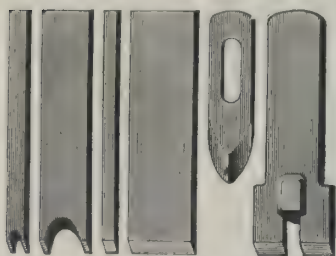


Fig. 2.

This tool is manufactured by the Stanley Rule and Level Company, of New Britain, Conn. Full particulars regarding it will be furnished by the manufacturers, or the tools can be had of hardware dealers.

THE STURTEVANT SYSTEM OF HEATING AND VENTILATING.

This system has been introduced in many large public buildings, theaters, halls, schools, and manufacturing establishments. The entire plant embraces a pipe heater for heating the air, a fan blower for forcing this air wherever desired, and some means of driving the fan, either an engine, electric motor, or belt from line shaft.

Mr. B. F. Sturtevant, of Boston, the pioneer in this line of heating and ventilating, has just completed new designs in his apparatus which embody radical changes simplifying the parts and increasing its efficiency. In the accompanying cut is represented the new type of "Sturtevant Steam Hot Blast Apparatus." The fan is constructed of steel plate, securely stayed; the engine is of the very highest grade, and the heater, in which the most material changes have been made, is constructed as follows: Upon a wrought angle iron foundation are placed hollow sectional bases, having vertical steam pipes screwed into them. These pipes are connected at the top by cross pipes, so that a continuous circulation up, over, and down is maintained. Both the nut and the outlet connect into the same heads, making everything simple and convenient. The entire heater is screwed in a steel plate jacket, rendering it fireproof.

The principal advantages of this system of heating and ventilating are that, owing to the high velocity of the air across the pipes in the heater, only about one-third to one-fourth of the amount of pipe is required that is necessary in a direct heating system; the entire heating surface is contained in a single heater rendered fireproof; all freezing and leaking throughout the building is avoided; all the steam valves are within a few feet of each other; the air is mildly tempered, not burned; the air supply may be

taken from the purest possible source; the ventilation is always positive, unaffected by changes in wind and weather; the hot air distributing pipes may all be built into the walls, and for a given amount of air may be made smaller than hot air furnace pipes; in a word, the system combines those elements that are now so much sought in the heating and ventilating of all buildings.

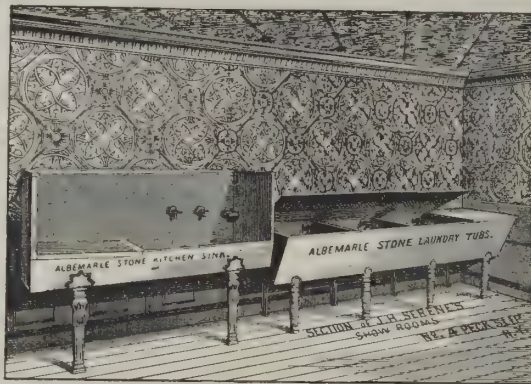
Mr. Sturtevant has recently issued a handsome illustrated treatise on ventilation and heating, giving much valuable and interesting information regarding his system. It will be sent upon application.

H. W. Johns' Liquid Paints.

These paints are prepared ready for the brush in all the newest shades and standard colors, and are offered as the most durable and economical paints ever produced for general structural purposes. The productions of the H. W. Johns Manufacturing Co. are too well known, not only throughout the United States, but in almost all quarters of the world, to call for especial commendation. It may not, however, be generally known that the firm makes a specialty of offering, free, suggestions as to colors and quantities of paints to be used, upon receipt of information as to style, size, etc., of houses to be painted. In order that these suggestions may be the more valuable, inquirers are invited to send to the company, whenever possible, photographs of the dwellings or buildings they intend to paint. The New York office of the company is at 87 Maiden Lane.

SOAPSTONE LAUNDRY TUBS AND KITCHEN SINKS.

Non-porous soapstone laundry tubs and kitchen sinks, which cannot therefore absorb the filthy wash water, are a great desideratum in the fitting up of any complete residence. The illustration herewith shows such tubs and sink, as made of Albemarle soapstone, by Mr. J. H. Serene, of No. 4 Peck Slip, New York City. The Albemarle soapstone is quarried in the South, and has a dense, close grain. It is handsome in

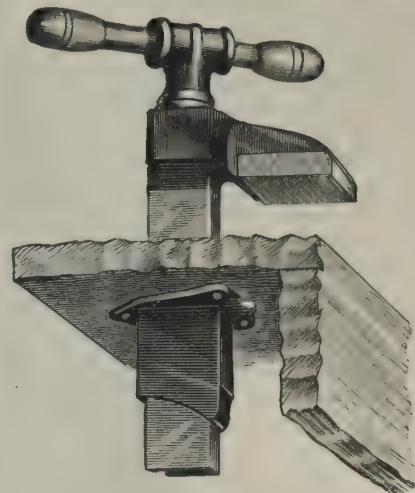


SOAPSTONE LAUNDRY TUBS AND KITCHEN SINK.

color and uniform in texture, being stronger than any other soapstone, while in use it becomes as hard and smooth as polished marble. This stone also affords a most valuable material for making bath tubs, acid tanks, fire-place linings, griddles, foot-warmers, etc.

CARPENTER'S VISE.

The carpenter's vise which is shown in accompanying cut can be readily carried in the tool chest, as it takes up but little more room than a common free plane, and when wanted for use is easily and quickly attached to

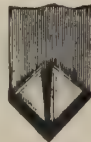


CARPENTER'S VISE.

the bench, requiring simply the cutting of a small square hole in the side and putting in three screws, as shown in the cut. It can be attached to a box, or a board nailed to a post or stud, making it frequently a great convenience for use in places where a regular carpenter's bench is not available. This vise is made by the Standard Tool Co., of Athol, Mass., who manufacture a very nice line of tools for carpenters and machinists, such as vises, try and center squares, rules, calipers, gauges, bevel protractors, pliers, straight edges, etc. They issue a very fully illustrated catalogue, which they will send to all applicants.

METALLIC HIP SHINGLES.

These shingles have been largely introduced through the cities and larger towns of Ohio, Michigan, Indiana, and other States, and are said to be rapidly growing in favor wherever used. It is claimed for them that they give complete protection to the hips, being a covering for each course of shingles or slates, thus preventing even a possibility of rain or snow getting into the hips, while they preserve the symmetry of the building and give the roof a very neat and finished appearance. Special inducements are offered to contractors and builders to try these shingles. Address Metallic Hip Shingle Co., Toledo, Ohio.



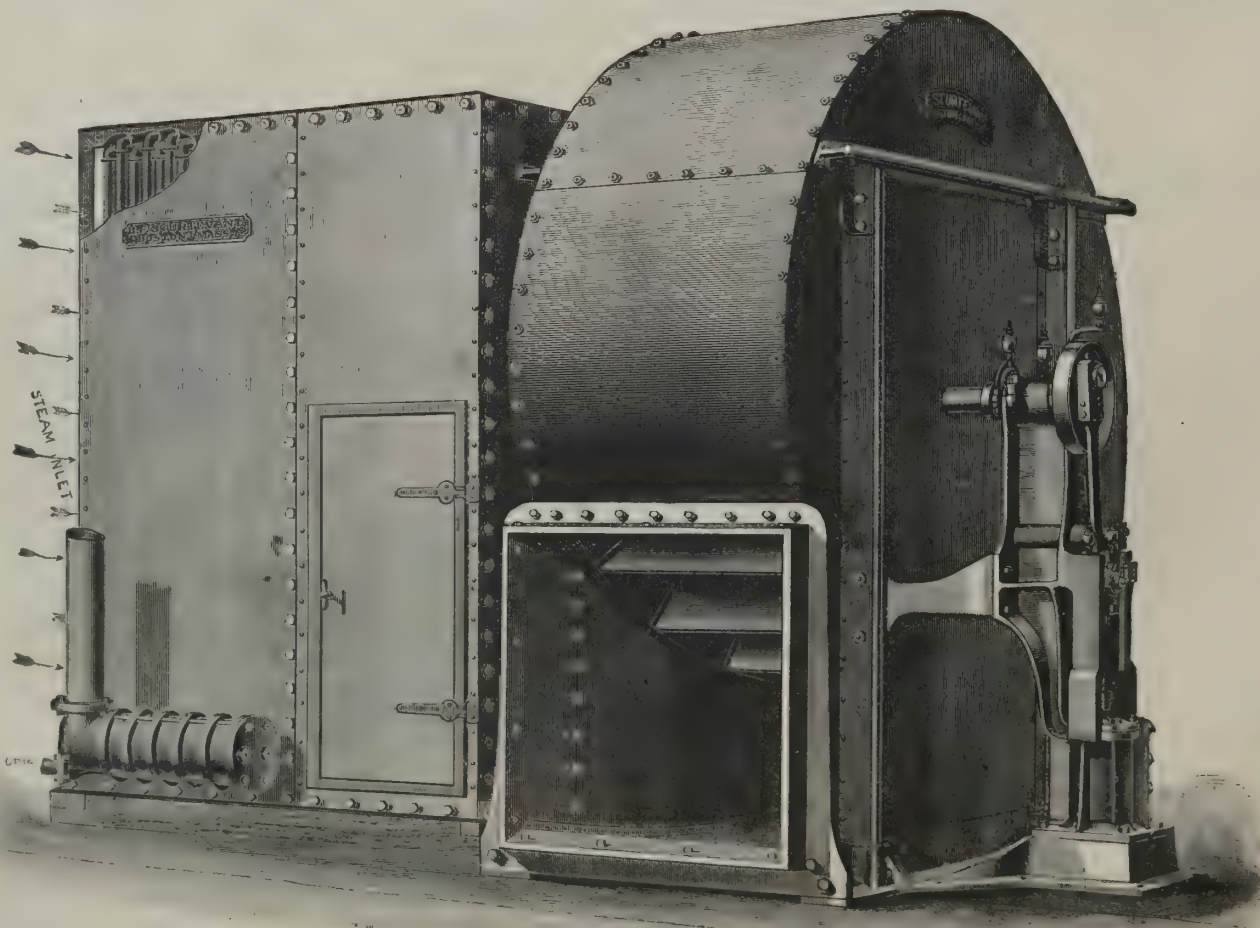
Corrugated Iron Lath.

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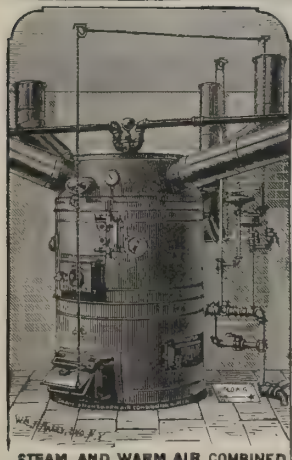
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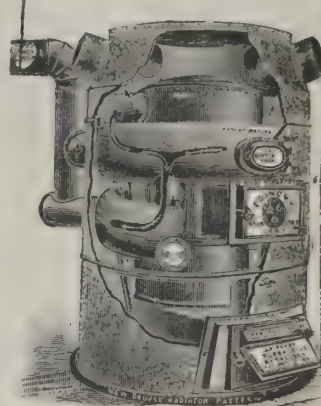
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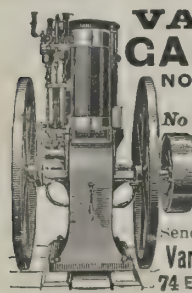
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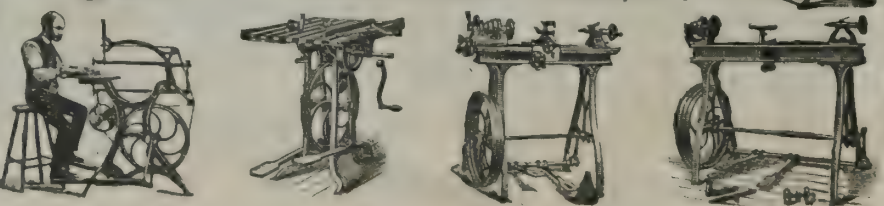
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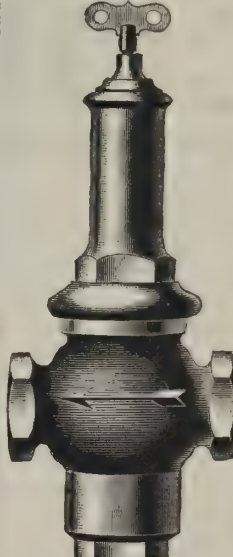
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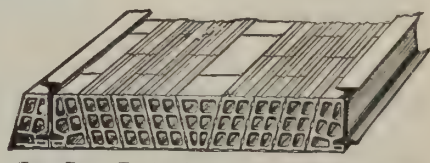


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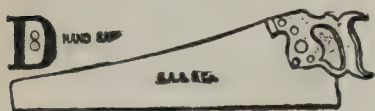
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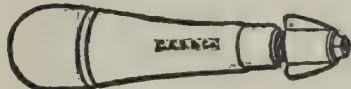
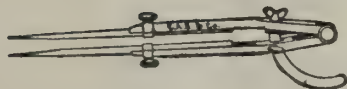
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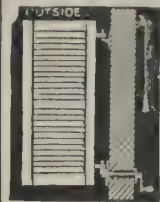
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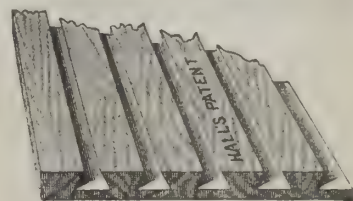
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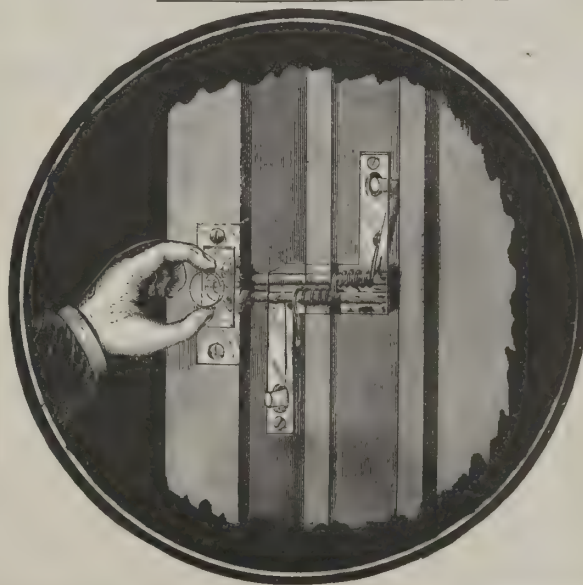
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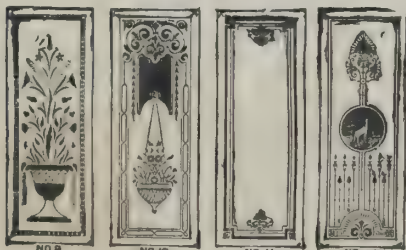
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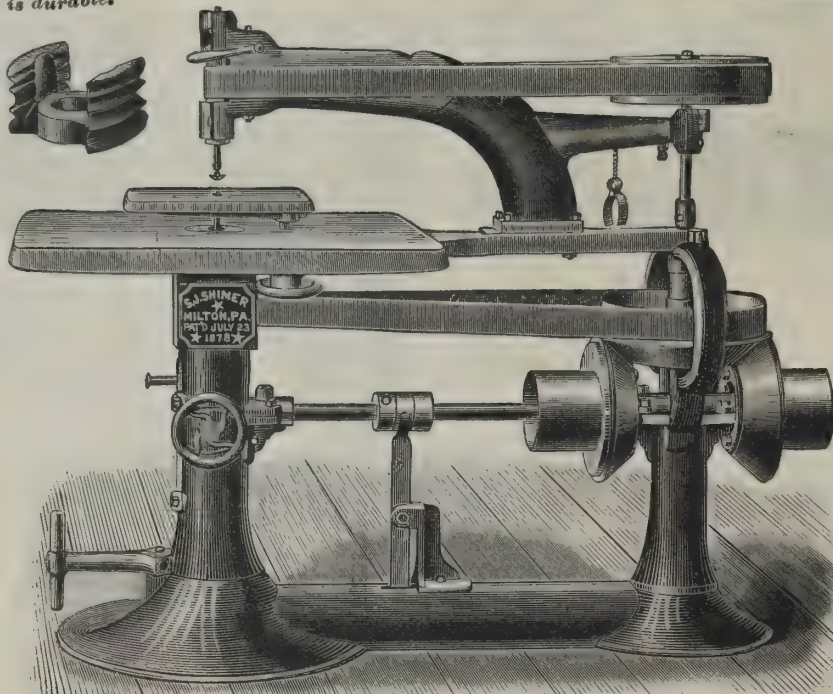


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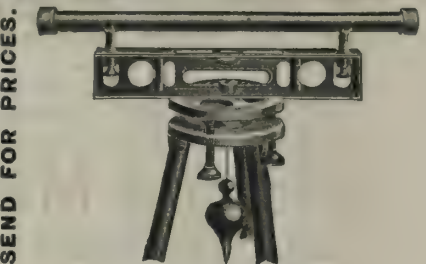
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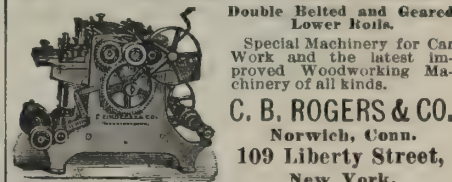
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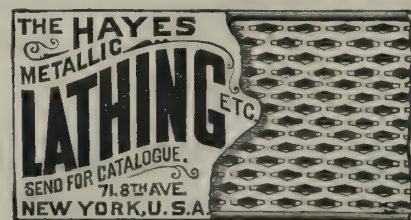
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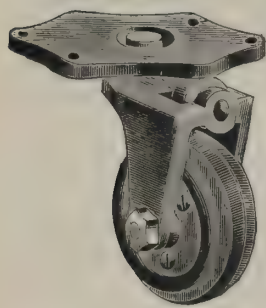


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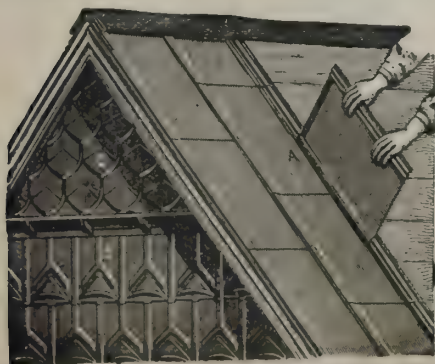
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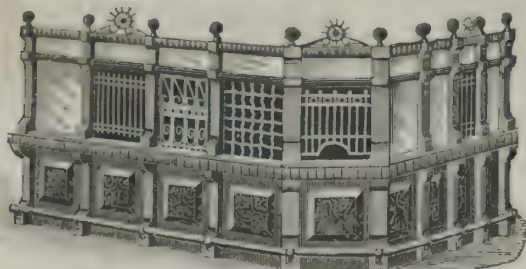
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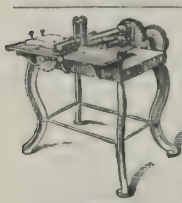
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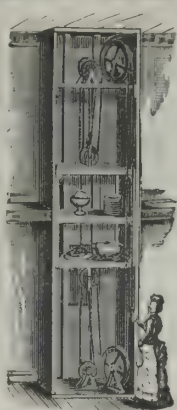
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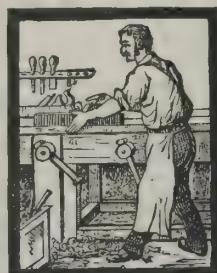
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(1) E. W. C. writes: 1. Would it be
more advisable for a student of mechanical drawing to
study books or go into an office? A. You should first
study and then try to get a position in an office. 2. If
to study books, what to study, and where to get them—
estimated cost, etc.? A. We can supply you with many
excellent works by mail. We name a few: "Mechani-
cal Drawing Self-taught," by Joshua Rose, \$4. Mac-
Cord's "Easy Lessons in Mechanical Drawing," \$2.50
and \$3.50. "Mechanical Drawing," prepared for the
use of students of the Massachusetts Institute of Tech-
nology, by Faunce, \$1.25. 3. Are there schools where
mechanical drawing is a specialty? A. Mechanical
drawing is taught in all of the principal colleges and in
many public and private schools all through the United
States. Mechanical drawing alone is hardly enough to
be called a specialty.

(2) C. V. B. asks: Is heart Georgia
pine being used as fence posts in the Eastern and Middle
States? A. Not very extensively. 2. If so, how long
will they last? A. Will last about ten years. 3. What
is the advantage in durability? A. None over locust or
red cedar.

(3) T. H. F. — Walnut Stain. — Mix
equal parts of solution of extract of logwood and solu-
tion of saffron, dilute with spirit of wine, add some
solution of tin in hydrochloric acid. For a variety of
acid, water sulphide and gallate of iron stains, see
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(4) G. W. — Area of Smoke Stacks. —
The formula for chimneys for boilers is area =

H. P.

$1.45 \times \sqrt{h}$

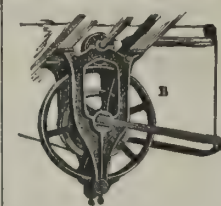
in square feet; h = height. A common practice, for
iron smoke stacks for medium sized boilers, is to allow
25 square inches of chimney area for each square foot
of grate surface. See Nystrom's Mechanics for a
valuable table of heights, areas, and horse power of
chimneys, \$3.50, which we can mail. E. D. L. sends
rule: Multiply the h. p. by 112 and divide the product
by the square root of the height of chimney for the
area in square inches.

(5) F. McD. — Ebony Finish on Counter.
—We doubt the possibility of your being able to make
a satisfactory ebony finish on a Georgia pine counter.
The sap pores would take a dye by absorption, but the
resin veins would not take a permanent color and would
show the resin streak through the varnish.

(6) A. B. F. writes: In setting poles for
electric light or telephone, what is the best preparation
to prevent them from rotting in the ground? At what
season of the year is it best to cut poles for above pur-
poses? A. Soaking the ends of the poles in a strong
solution, say of 20 pounds sulphate of iron to 100 pounds
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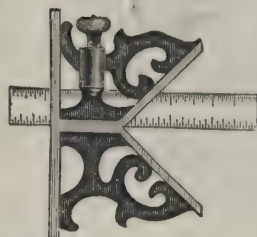
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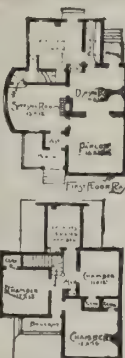


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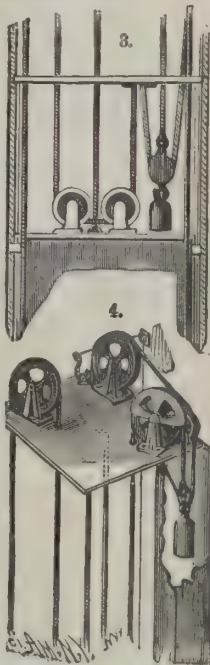
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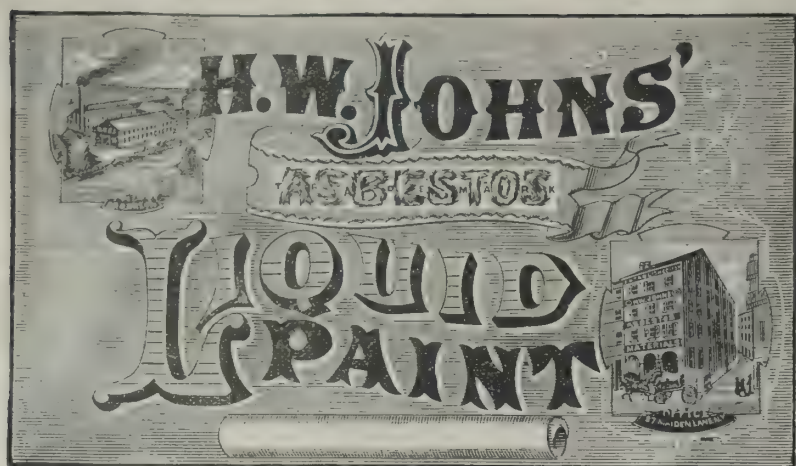
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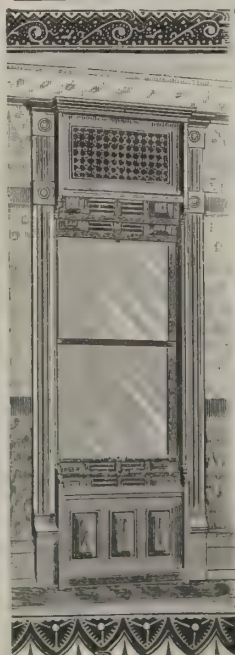
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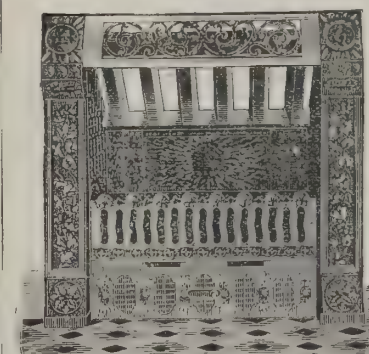
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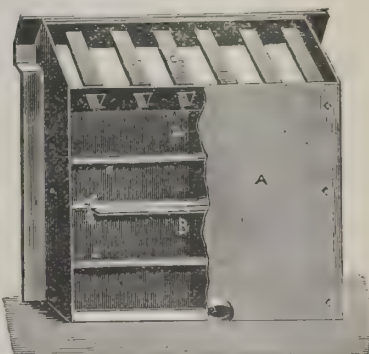


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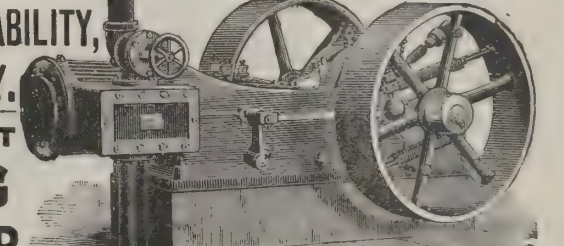
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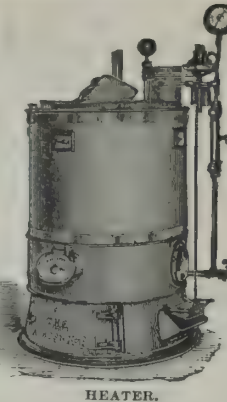
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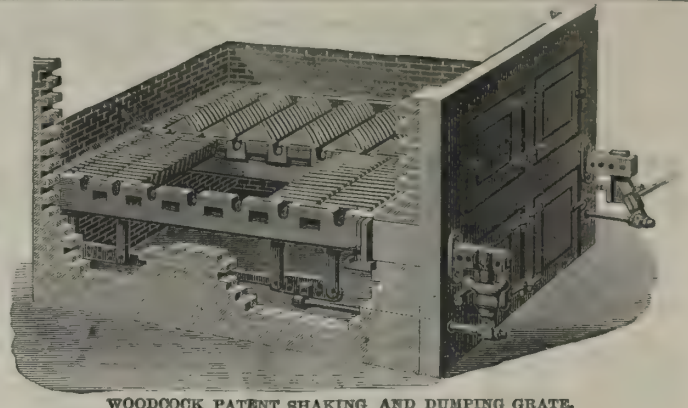
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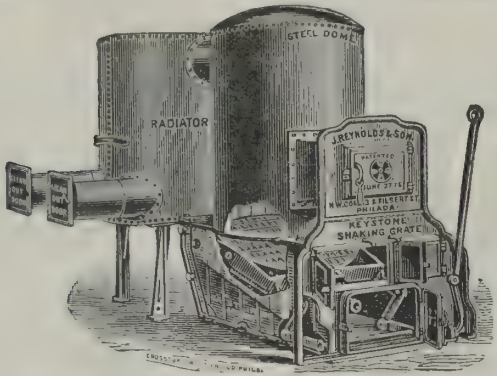


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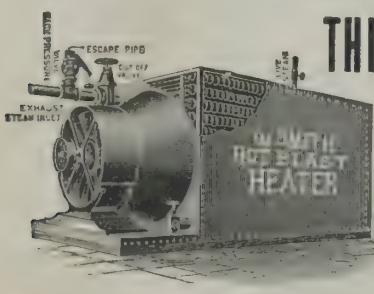
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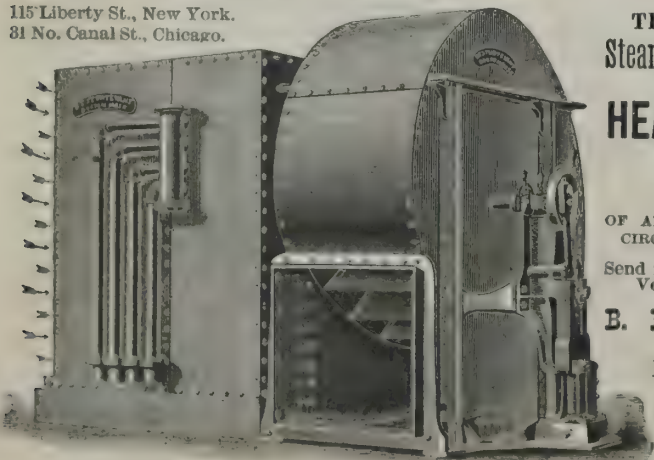
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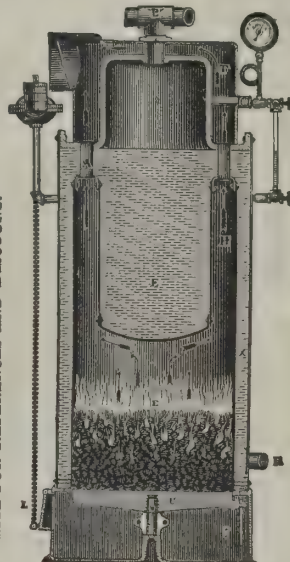
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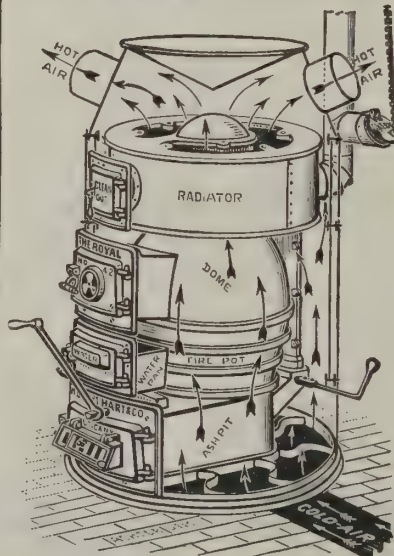
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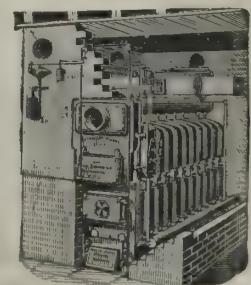
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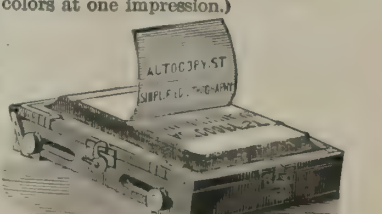
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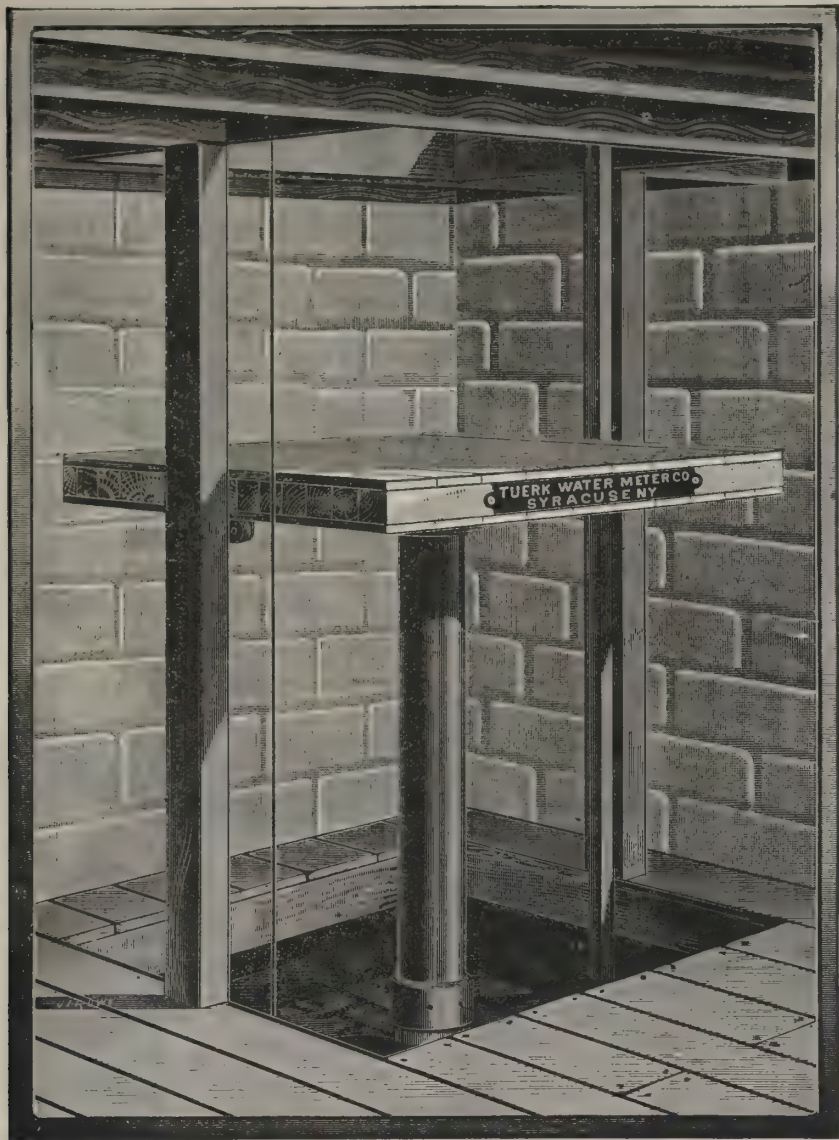
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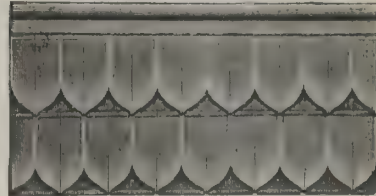
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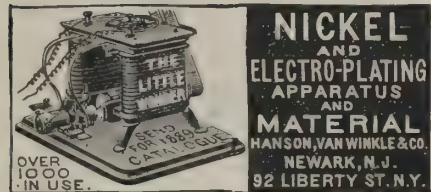
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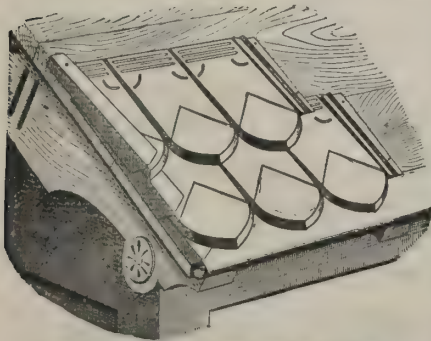
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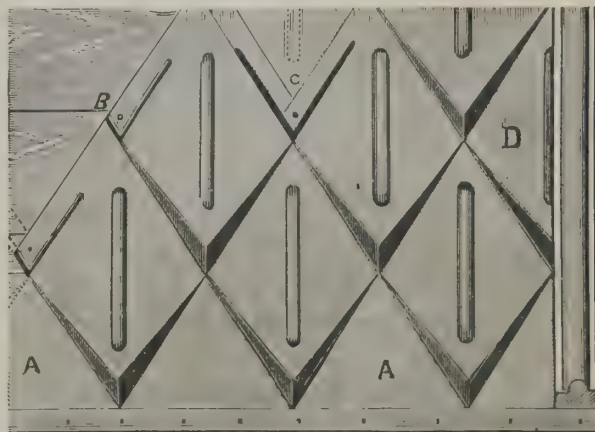
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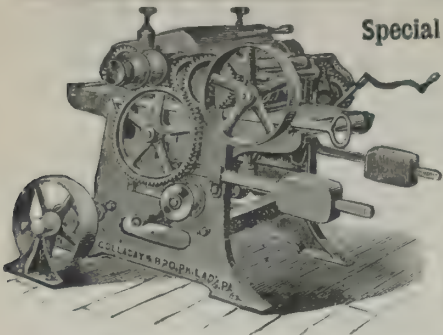
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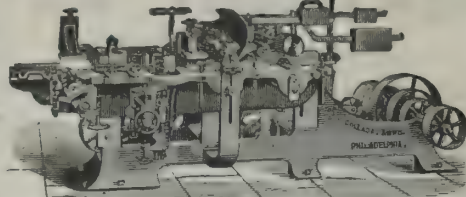


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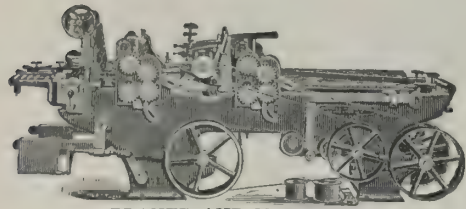


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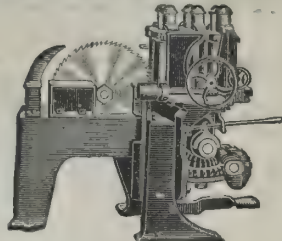


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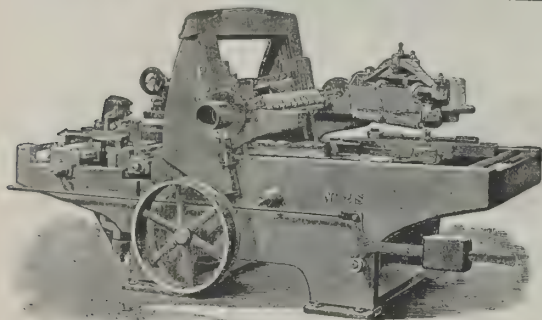


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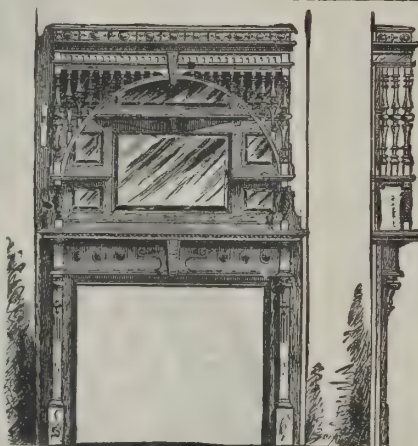
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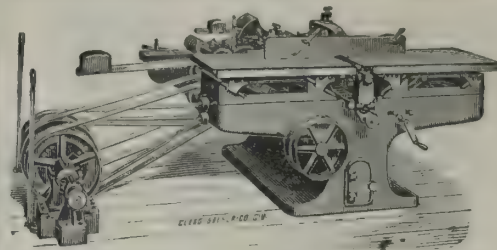
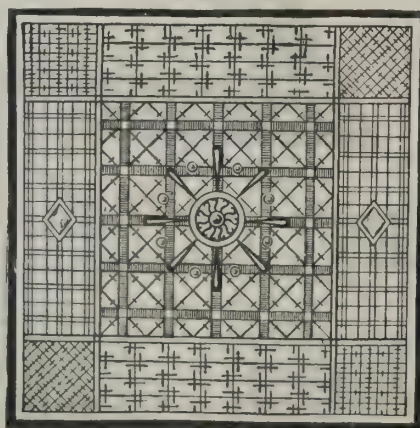
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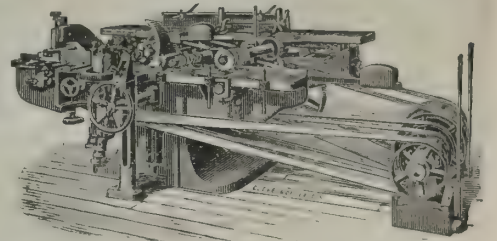
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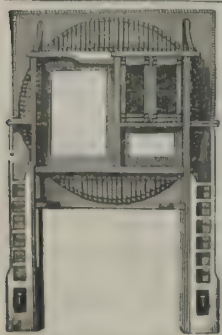
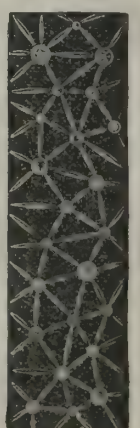
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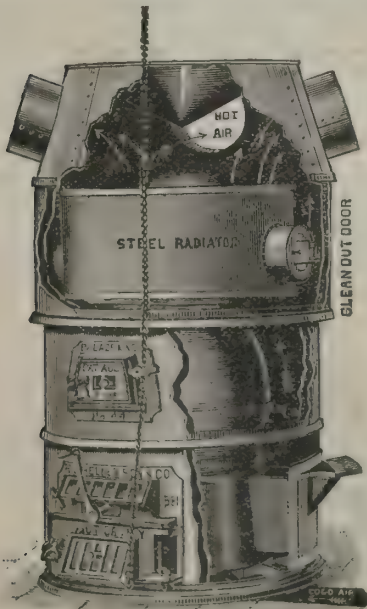
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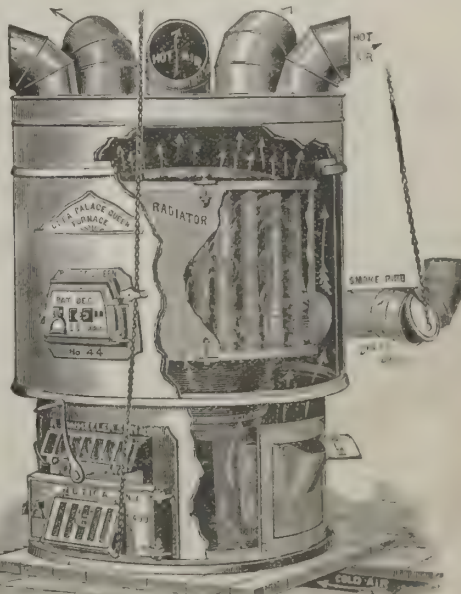
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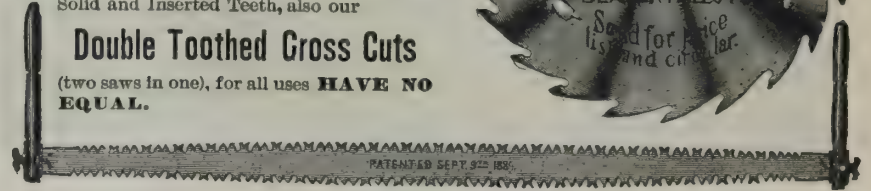
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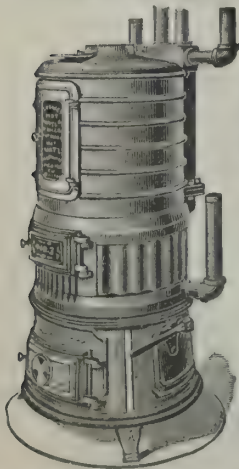


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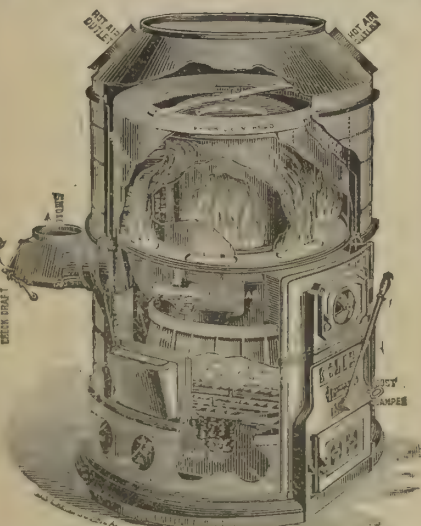
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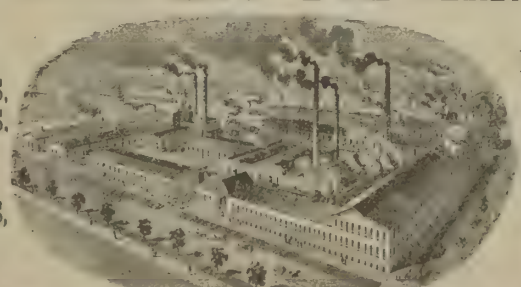
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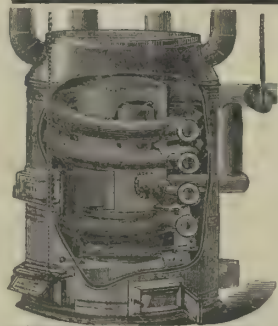
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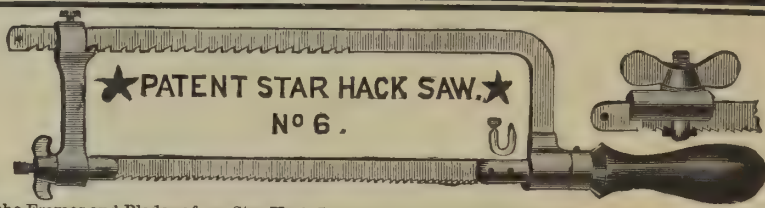
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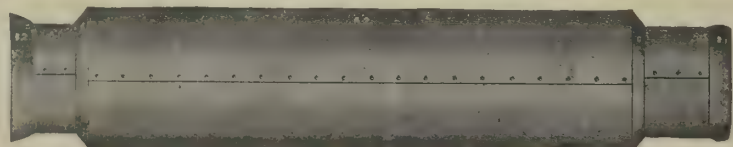
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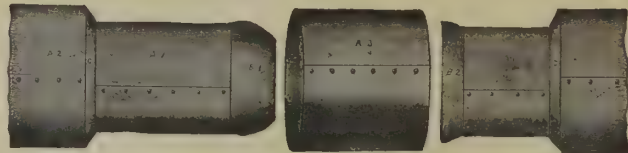
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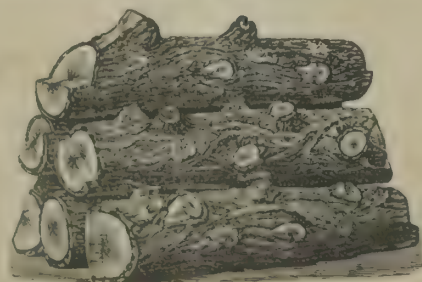
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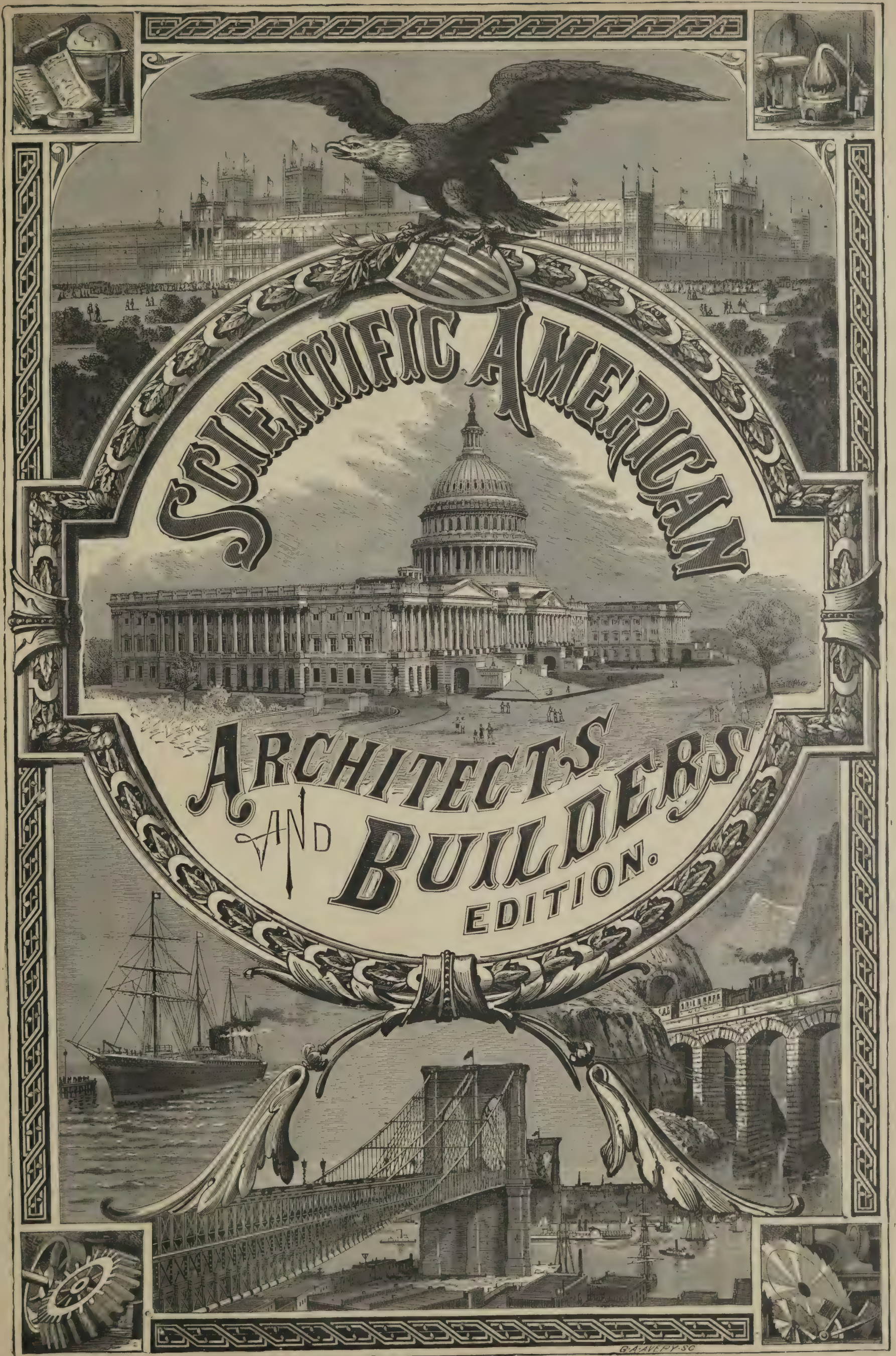
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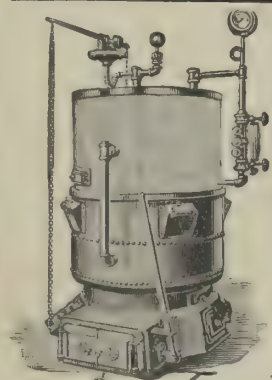
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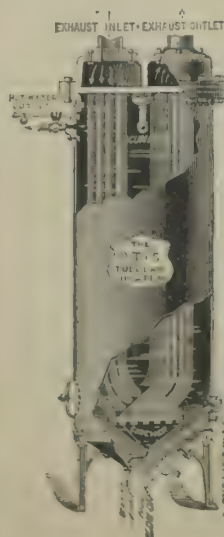
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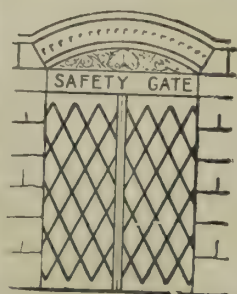
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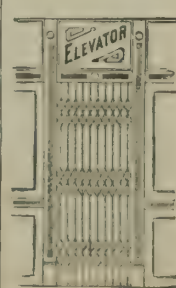
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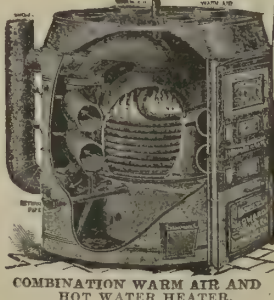
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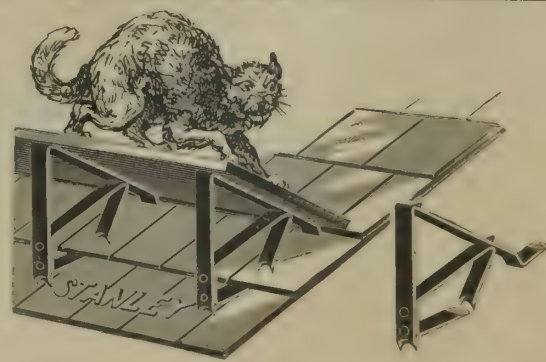
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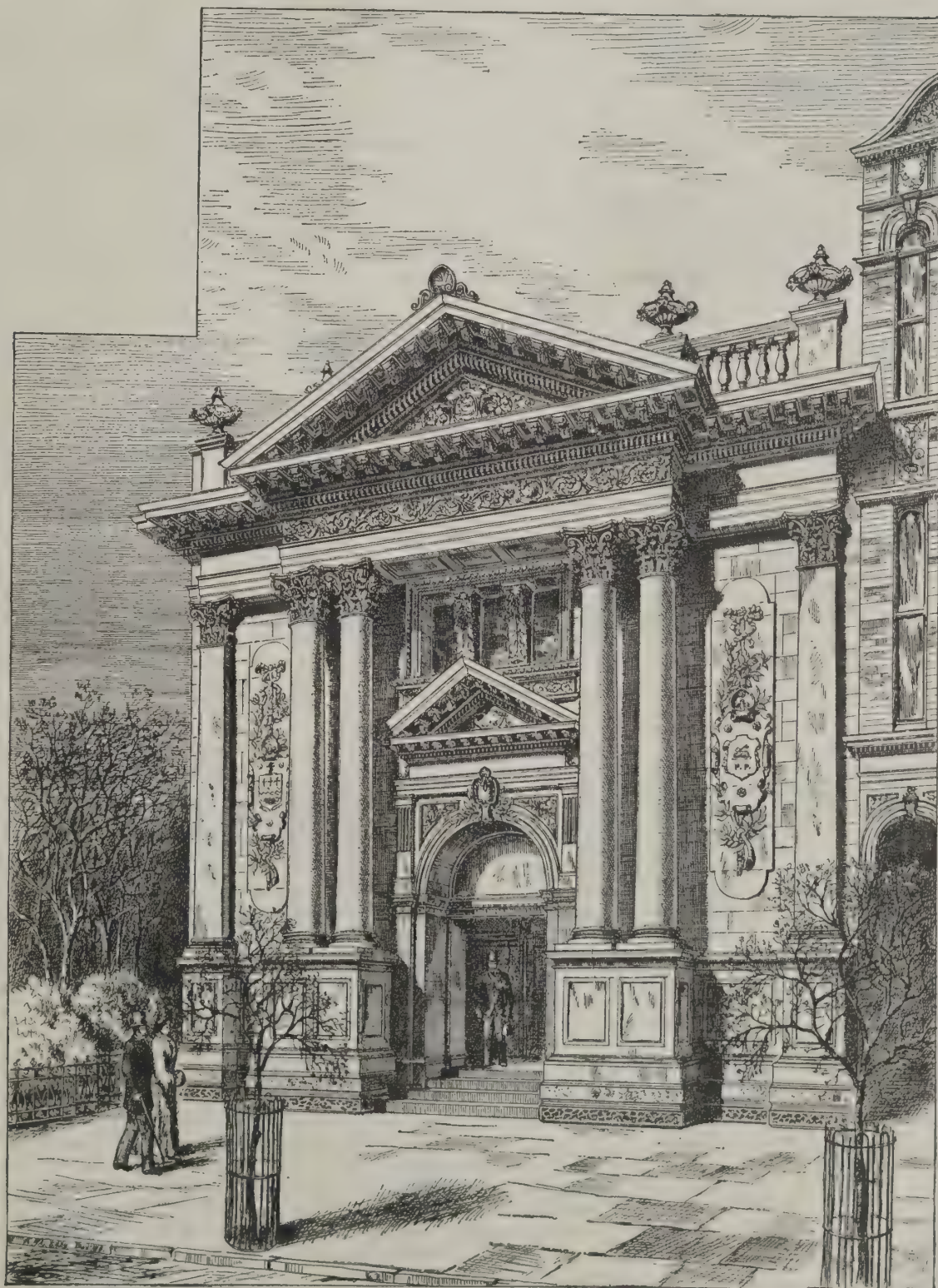
EDITION.

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DESIGN FOR A BANK BUILDING.

[For description see page 75.]



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THE

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A DWELLING FOR \$4,000.

This is the title of one of our colored plates for the present month.

The elevations of this dwelling are very effective. On the first floor the parlor, dining room, and large reception hall are connected by sliding doors; the square bay in parlor is carried up to the second floor chamber, terminating above in a square tower. The dining room has an octagonal bay. The staircase is separated from reception hall by a portiere. On the second floor are four chambers and a bathroom, with good closet accommodation.

Size of structure 28' x 36', exclusive of bays and veranda.

Height of stories—first story 9' 6", second 9' in the clear.

Materials—Foundation of stone. First and second stories clapboarded, with a belt of shingles above first story windows. The gables are also shingled.

For size of rooms see floor plans.

There is a cellar under whole of the house, and two good chambers and trunk room in attic. For construction details see plate, page 78.

A SUMMER COTTAGE FOR \$1,200.

The colored plate over the above title shows a cottage of unpretentious but pleasing exterior. The piazza across front and on both sides, and the balcony on second floor, afford ample outdoor accommodation. The building has a frontage of 20 feet by a length of 31' 6". The number, size, and arrangement of rooms will be seen by a reference to the floor plans. On page 79 we give a plate of details.

The Final Payment Clause in Building Contracts.

It has been suggested to us by an architect of this city that a synopsis of the lien laws of the different States and Territories—in so far as they affect the time for the final payment of building contracts—would be of great use to such architects as have occasion to draw contracts to be executed in other States.

We have accordingly prepared the following schedule of what, in our opinion, after careful examination of the various statutes, is the longest time allowed for the filing of liens against real estate by sub-contractors, material men, or other persons furnishing labor or material to the principal contractor:

Alabama.....	4 months.	Nebraska.....	4 months.
Arizona.....	60 days.	Nevada.....	30 days.
Arkansas.....	90 "	New Hampshire.....	90 "
California.....	30 "	New Jersey.....	1 year.
Colorado.....	40 "	New Mexico.....	60 days.
Connecticut.....	60 "	New York.....	90 "
Dakota.....	6 months.	North Carolina.....	1 year.
Delaware.....	90 days.	Ohio.....	60 days.
Florida.....	6 months.	Oregon.....	30 "
Georgia.....	3 "	Pennsylvania.....	60 "
Idaho.....	30 days.	Rhode Island.....	6 months.
Illinois.....	3 months.	South Carolina.....	90 days.
Indiana.....	60 days.	Tennessee.....	4 months.
Kansas.....	60 "	Texas.....	6 months.
Kentucky.....	60 "	Utah.....	30 days.
Maine.....	30 "	Vermont.....	3 months.
Maryland.....	60 "	Virginia.....	30 days.
Massachusetts.....	30 "	Washington Territory.....	60 "
Michigan.....	60 "	West Virginia.....	60 "
Minnesota.....	90 "	Wisconsin.....	6 months.
Missouri.....	4 months.	Wyoming.....	90 days.
Montana.....	90 days.	District of Columbia.....	3 months.

In Mississippi the time is six months if the amount is over \$150. In Iowa and Louisiana, and in Mississippi for amounts under \$150, there is apparently no time fixed for filing liens in favor of the owner, though purchasers and mortgagees are protected if the lien is not filed within a certain time.

It is probable that in some of the States where the longer periods obtain, it was not the intention of the Legislature to give to laborers and material men such extended time; but we have constructed the schedule according to what seems to us to be the most unfavorable interpretation of the law from the owner's standpoint, with a view to fixing such time for the final payment as shall, without any question, protect the owner against the claims of all parties other than the original contractors. The time that original contractors, that is, all parties dealing directly with the owner, have for filing liens, is, in some States, different from that given to sub-contractors and others; the owner, however, can protect himself against a claim of lien from all persons with whom he deals directly by requiring a release of all claims on the property before the contract is finally settled. The time for the final payment need not be deferred beyond the last day on which it is possible for third persons to file liens against the property.

The contract should, however, provide that the final payment shall not be due for a period exceeding by a few days the time allowed sub-contractors for filing liens; as the exact day when a building is actually completed, or work on the contract ceases, is often a matter of dispute. It is best to defer the final payment until five or ten days after the time apparently open for filing liens has expired.

The following is submitted as a final payment clause for use in contracts to be executed in Massachusetts, and the same will hold good for other States with the

necessary change as to time indicated by the above schedule:

"§— thirty-five days after the said work shall have been completed in accordance with the terms of this contract; provided, further, however, that no liens shall then have been filed against the property and remain undischarged, and that said contractor shall tender to the owner a satisfactory release under seal of all claims on his part against the owner's estate, and shall also (if requested) furnish satisfactory vouchers, receipts, or other evidence that no claim against the said estate can be made by any person or persons who have furnished labor or materials for the work embraced in this contract.—*American Architect.*

The Plan.

This is the great essential, the fundamental principle. It is to obtain the plan that the building is erected. We are not speaking of monuments. That is a special art.

The success of all buildings devoted to the wants of life depends almost entirely on the plan. No amount of art can overcome the defects of the plan, and although it is perfectly possible to harmonize the two conditions of a good plan and an artistic exterior, still the first essential is the plan, and no convenience of arrangement, no opportunity to obtain sufficient light, no pleasing and desirable effect of interior, must be sacrificed or even injured for the sake of the exterior. However, it is often possible by careful study to so arrange the plan that the desired exterior can be obtained without any injury to the interior.

A perfect building will have a plan that satisfies every requirement of convenience and of pleasing effect, and at the same time an artistic exterior, and, as a whole, will leave nothing to desire. But, if we must hold to the one and lose the other, let us hold to the plan.

In all French competitions, where the jury is chosen in part from the architects, members of the Academy of France, the first importance is attached to the plan. No elegance or beauty of exterior can redeem a defective plan.

It is for this reason that in designing a building it is best to confine ourselves solely to the plan, with little or no regard for an elevation until a satisfactory plan is obtained. Then design the best elevation the plan will admit of, modifying the plan if desirable, wherever this can be done without injury, but never sacrifice any part of the plan to the elevation.

In planning a house for the residence of the parties building, it is not at all sufficient that the architect should pronounce the plan a good one. He must go over it in the most minute details with those who are to live in it, learn their habits, their tastes, and even their whims, all of which must be satisfied. It is sometimes very difficult to separate the well-established wishes, which must be satisfied or cause disappointment, from those ideas which occur at the moment and will disappear as quickly.

A client does not wish the architect to allow him to have his own way, against the architect's judgment, without argument and without protest. If he is wrong, he desires to be shown why he is wrong, and, if possible, convinced that something other than his pet idea is better; but at the same time he insists on being the judge, from whose final decision there is no appeal.

In general, this is where a young, enthusiastic, talented, artistic architect is most liable to fail, while those who show no ability at designing an elevation or an artistic detail will often produce the best plans.—*W. L. B. Jenny.*

Bending Wood.

The following is the method which is adopted to make the well known Austrian bent wood furniture. The material to be bent is usually red beech, which grows very abundantly in the Hungarian forests. The timber is sawed into strips 1½ to 2 inches square, according to the work for which it is intended, and then turned in a lathe into smooth, round rods. These rods are placed in an air-tight case, where they are exposed for fifteen minutes to the action of superheated steam. They are then so soft and pliable as to be easily bent by hand, and are in this condition fitted to iron patterns, well secured, and left to dry. The drying takes from two to eight days, according to the size of the piece. When it is complete, the wood is detached from the pattern and is ready to be joined with other pieces, varnished, polished, and sent out in the shape of finished furniture.

Plans and Specifications.

We would remind our readers that we can promptly supply full building plans and specifications for any of the structures illustrated in this publication. We are assisted by an able corps of architects. Our work extends to all parts of the country. Many buildings have been erected, and in every case with much satisfaction. Address Munn & Co., architects, 361 Broadway, New York.

NEW BANK.

This building has been erected in Lord Street, Southport, Eng., for the Preston Banking Company, Limited. The building is of stone from Darley Dale, the columns and pilasters being red Peterhead granite. The walls of vestibule are lined with faience. The banking room is 52 feet by 32 feet; the floor space for the public is laid with ceramic mosaic, and that behind the counter with oak blocks. The building is lighted wholly from the roof by means of large lantern light, with an inner ceiling light framed in oak and glazed with lead lights. The walls of bank are finished in Keene's cement; the pilasters and columns incasing the iron ones supporting roof are in scagliola. The fireplace and mantel is glazed Doulton ware, and is a very handsome feature in the bank. The whole of the internal fittings are in black walnut, with the exception of counter and desk tops, which are City St. Domingo mahogany. Messrs. Wishart & Irving and Mr. L. Brimmer, of Southport, have been the contractors, and Mr. Ernest W. Johnson the architect.—*Building News*.

[SAN FRANCISCO CHRONICLE.]

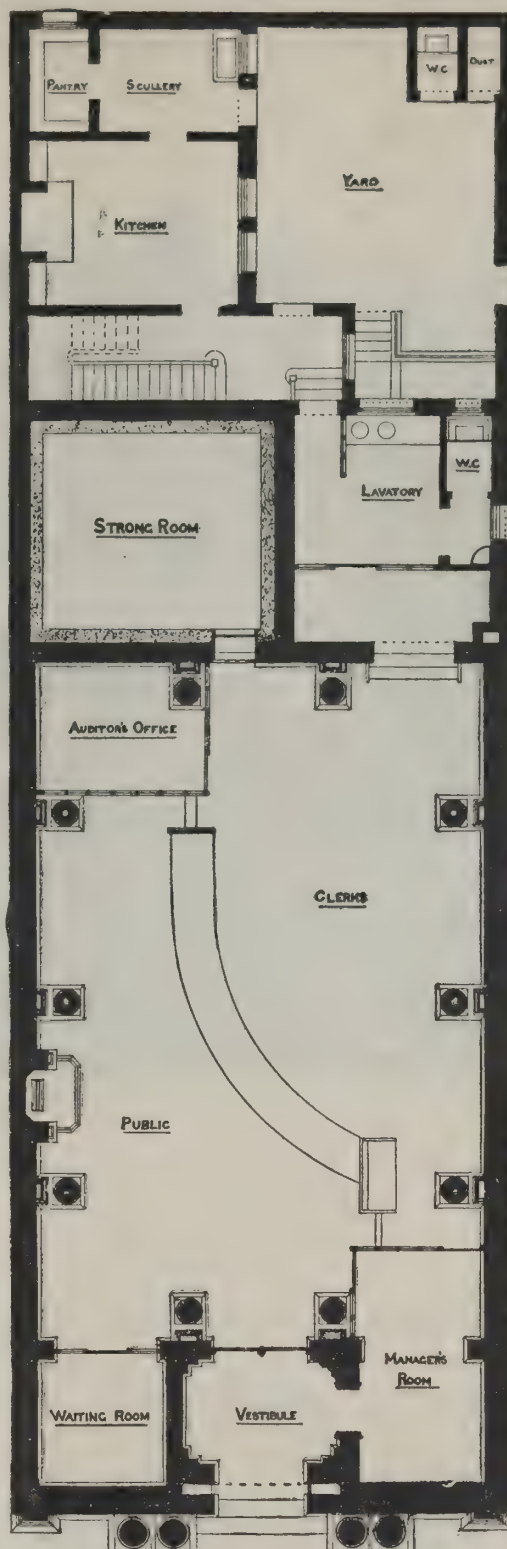
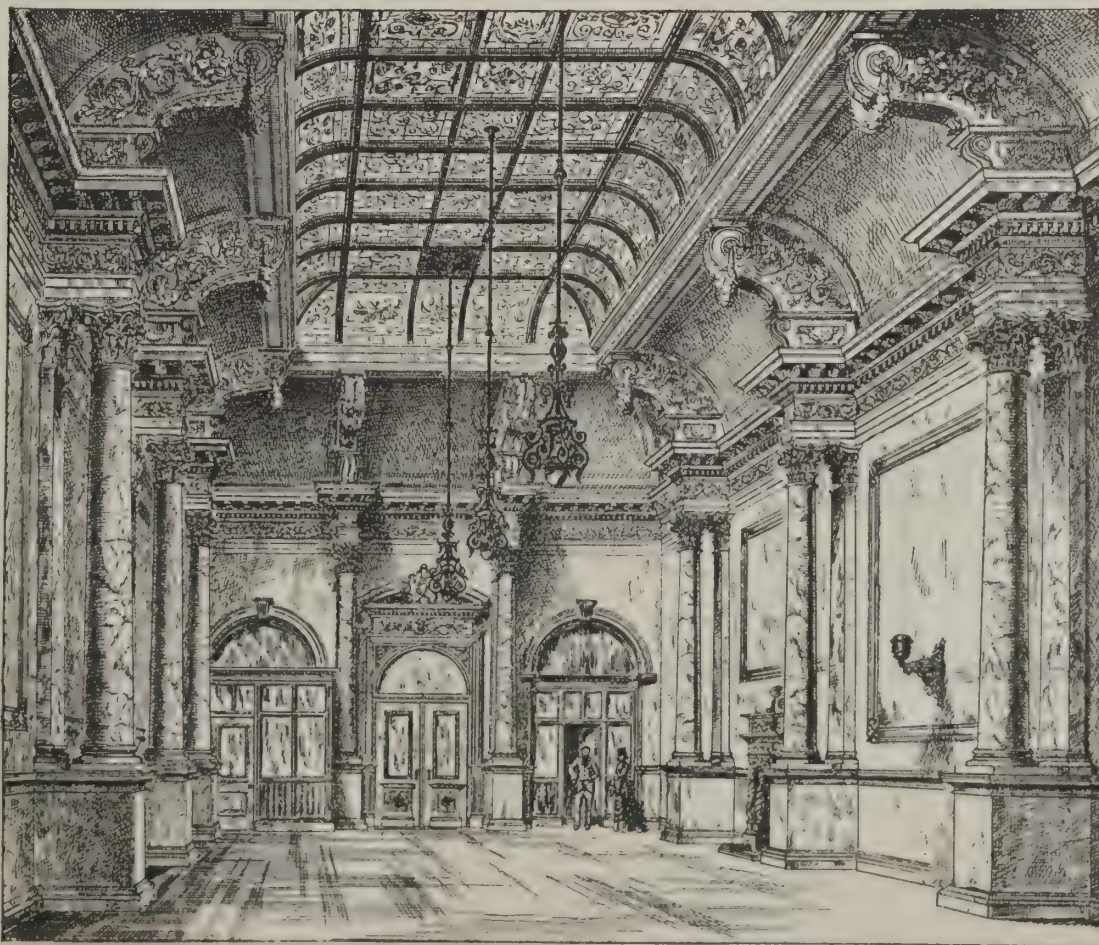
The Stanford Tomb.

The Stanfords have begun for their son a monument more enduring than brass, destined to perpetuate his name through ages, and to be the noblest monument ever erected to any human being—a university with an endowment so princely that it amounts to more than the combined endowments of all other American universities. On the Palo Alto estate, rather more than half a mile from the site of the university, and slightly less than that distance from Governor Stanford's residence, is the place selected by young Leland Stanford for his own residence. Excavation for the building began before his untimely death, and indications of the work then done are still apparent. The youth's desire to have his home on this spot was thwarted by the great Arbiter of his destiny, but his parents have most appropriately chosen the site for his last home on earth, and theirs, and they are now building there a tomb, the final closing of whose doors we hope may be long delayed.

The mausoleum was begun last June, and will probably be finished with the winter. The architecture is of a hybrid order, and its description might prove somewhat startling to an artistic purist. But its effect is imposing from its simple grandeur, and meets with the approbation of common sense, however the canons of art might condemn it. At a glance the building seems modeled after an Ionic temple.

From foundation to roof massiveness and simplicity are what chiefly attract one's attention. The foundation is of solid concrete—cement, sand, and crushed stone—and for its construction nine hundred barrels of cement were employed. It is 50×30 feet and extends 15 feet below the surface. The mausoleum itself, as it rises from the ground, is 24×40 6 feet and 24 feet high, and the only materials used are Vermont granite and Italian marble. Around it runs a row of Ionic columns, while at each corner is a Romanesque pilaster. The granite doors are 4 feet 6 inches by 8 feet 2 inches, with a bronze gate in front, approached by three steps and a small porch. These doors suggest Egyptian architecture, as do the sphinxes which stand guard at the entrance. Over the doors are cut in plain Roman letters the names of the three members of the Stanford family, and there is no other carving about the building. The smallest stone in the structure weighs more than a ton. The pediments, or gables, in common parlance, are each of one huge stone, weighing twenty-five tons, while the enormous keystones weigh thirty-one and one-half tons each. The roof is composed of two granite slabs weighing thirty tons each and measuring 26×9 8×1.

The interior is 15×22 3. On the end facing the door are to be three mural tablets, which are not yet in place. The interior is to be of marble exclusively, and no less simple or impressive than the exterior. The walls on all sides rise vertically to the height of ten feet and are then arched, the summit of the arch being eighteen feet

SCALE OF FEET
PLAN OF BANK.

INTERIOR OF BANK BUILDING.

from the floor. This marble lining is eight inches thick, and the arch alone weighs more than forty tons. There is to be no ornamentation whatever except panels and pilasters. The floor is of white marble tiles fifteen inches square.

Of the sarcophagi only one has arrived, while the other two are *en route* from Italy. Each is cut from a block of marble 8'6×5'6×4, weighs four tons, and is to be lined with steel plates.

The vault is not much larger than a bedroom in one of our dwellings, and yet in its erection not less than \$150,000 will have been expended. In the work two huge breast derricks are employed, running a five-inch rope, and with either derrick four men could move fifty tons, while each block in the tackle—there are one hundred pairs of blocks—has a capacity of 65,000 pounds.

A RESIDENCE AT BELL HAVEN PARK.

We illustrate the residence of Henry McCutcheon, Esq., at Bell Haven Park, in Greenwich, Conn., S. Edwin Tobey, Boston, Mass., architect.

This residence has an attractive appearance; the exterior walls are built of stone throughout, with the exception of the gables. The roof is covered with slates.

The hall is finished in oak.

Ceiling is in wood paneling.

The fireplace in hall is intended for burning wood.

The reception room is finished in white maple.

Billiard room is finished in ash.

The library and dining room are finished in oak.

The kitchen and its apartments are wainscoted, finished in ash.

There are four bedrooms, servant's bedroom, dressing room, linen closet, and bathroom, in second story. Each bedroom is finished in a different kind of wood.

There are four bedrooms, playroom, and bathroom that are finished off in attic.

The house is steam-heated and is furnished with electric bells and speaking tubes.

The floors are of hardwood, laid in narrow widths, and the windows are glazed with plate glass.

There is a cellar under whole of building that has a cemented bottom.

Our engraving was made direct from a photograph of the building taken especially for the SCIENTIFIC AMERICAN.

Experiments with Cement Mortar.

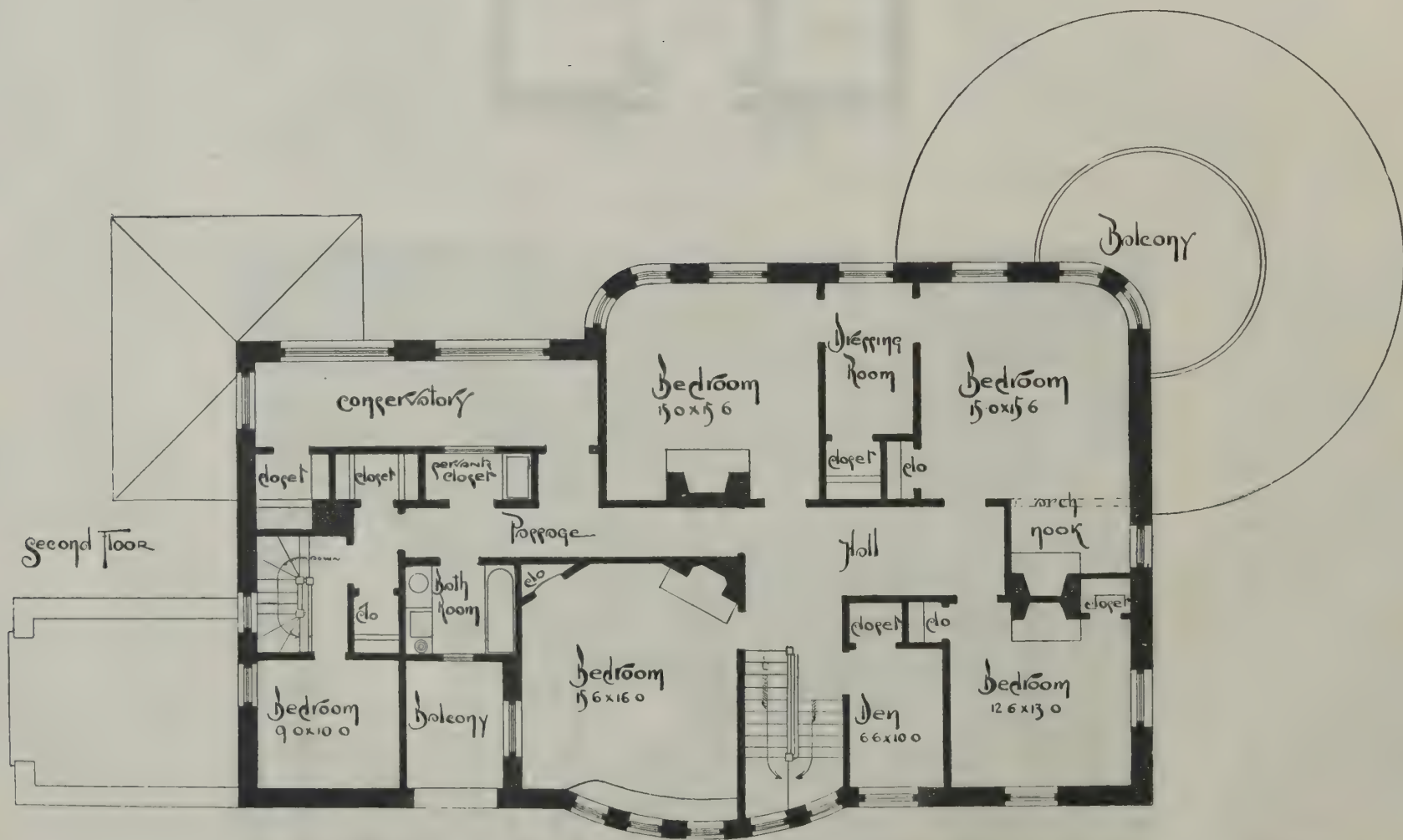
BY HERBERT BAMBER.

The mortar for the first experiment was composed of equal quantities of Rosendale cement and good sharp sand. Immediately after tempering, a set of briquettes was moulded. The remaining mortar was then worked over sufficiently often to prevent any decided indications of the commencement of setting, water being added to compensate for that lost by evaporation, and briquettes moulded in sets at increasing intervals for a period of about forty-two days.

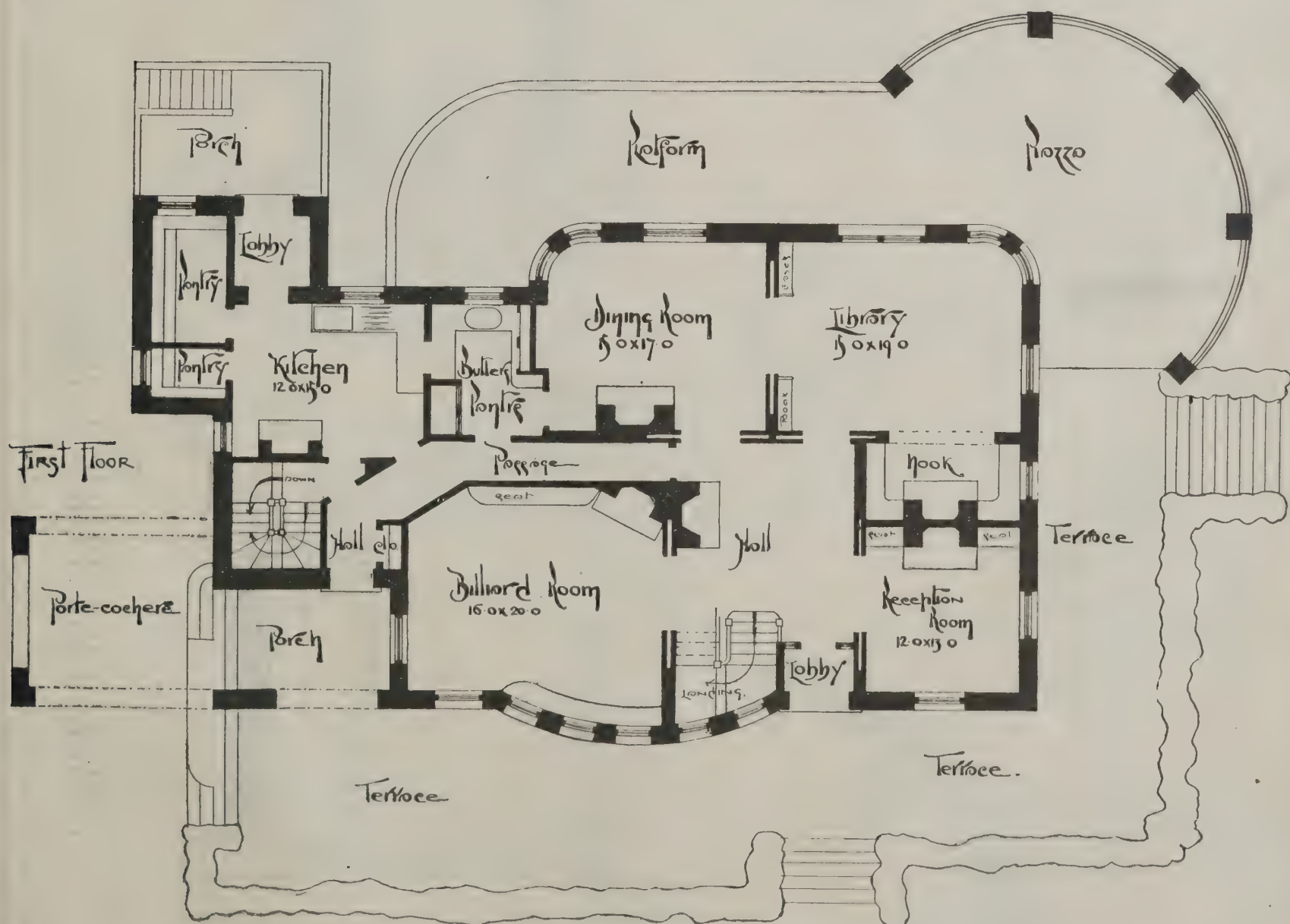
These briquettes were left in the air and tested when sixty days of age. The curves plotted from the tensile stresses at which these briquettes broke shows that the maximum strength of the mortar was obtained by keeping it in a plastic condition for about seventy-two hours before allowing it to set.

The mortar for the second experiment was also composed of equal parts of Rosendale cement and sand. After the first set of briquettes was moulded, it was allowed to set so that it would bear the usual test of a weight of four ounces on a wire one-twelfth of an inch in diameter, then it was retempered and another set of briquettes moulded. This operation was repeated twenty-one times, the repetitions extending over a period of about forty-nine days.

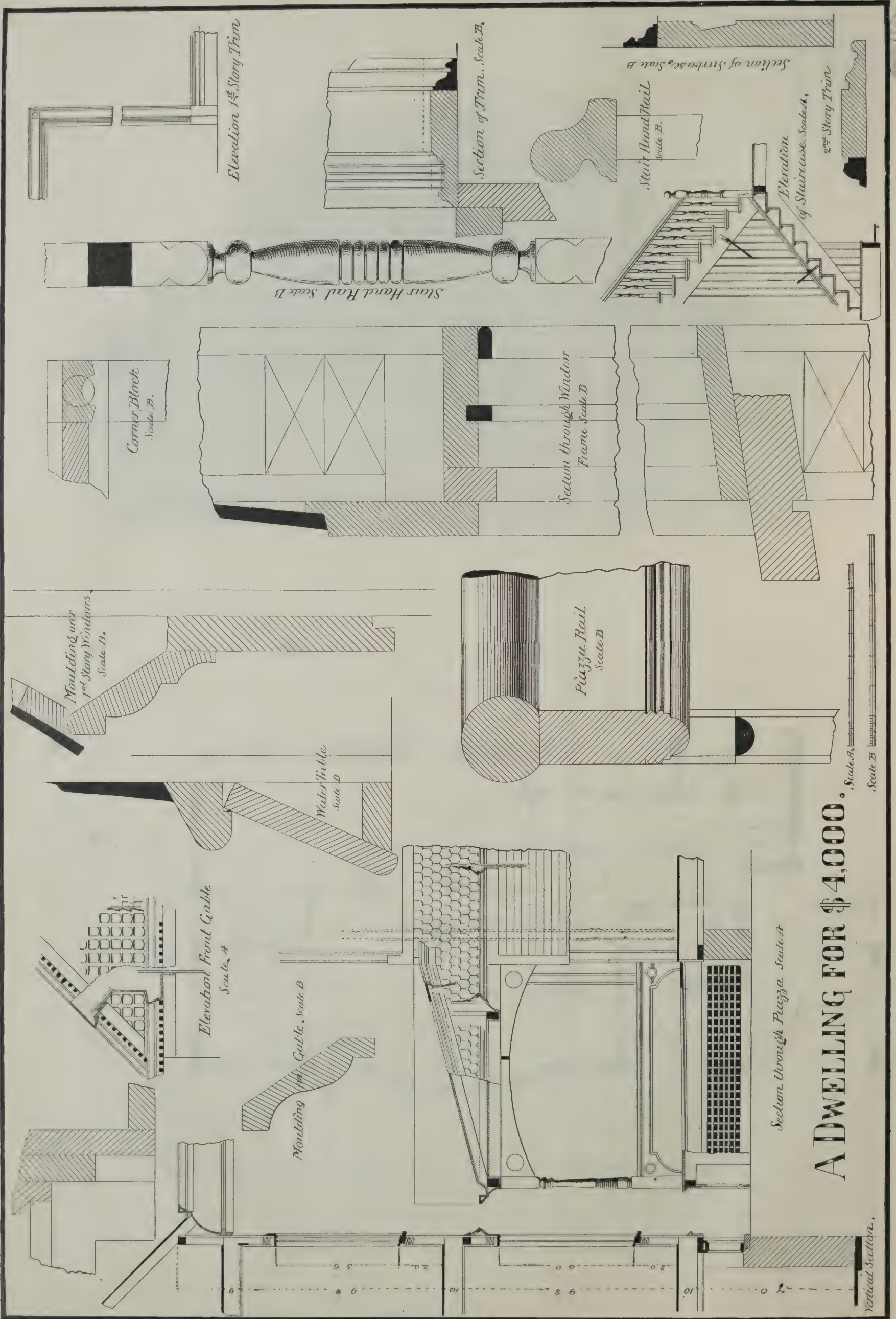
These briquettes were also left in the air and tested when sixty days of age. The curves plotted from the results of these tests show that the strongest briquettes were those moulded from the mortar after it had both set and been retempered three times.—*Proceedings Engineers' Club, Philadelphia*.



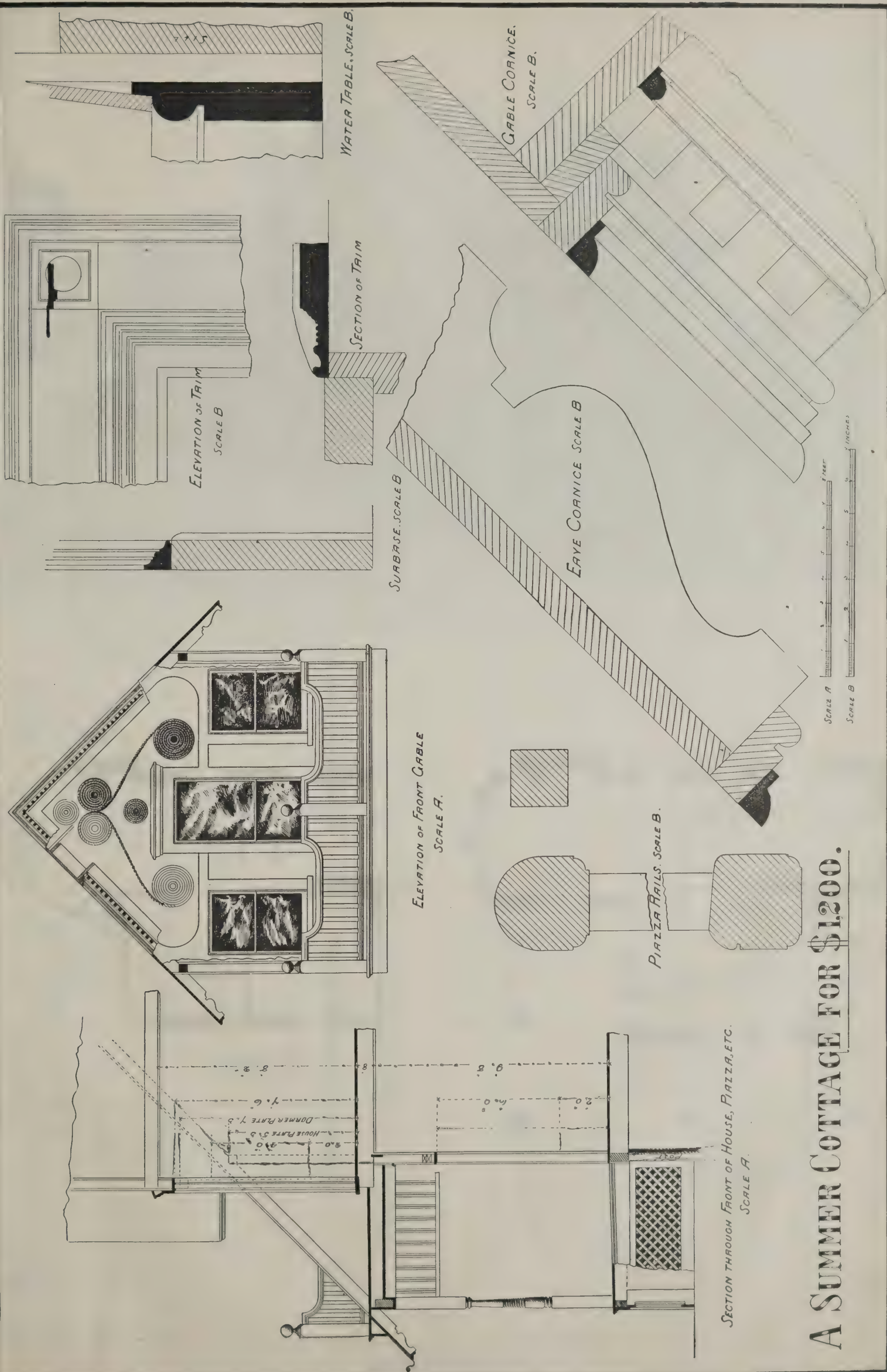
A RESIDENCE AT BELL HAVEN PARK.



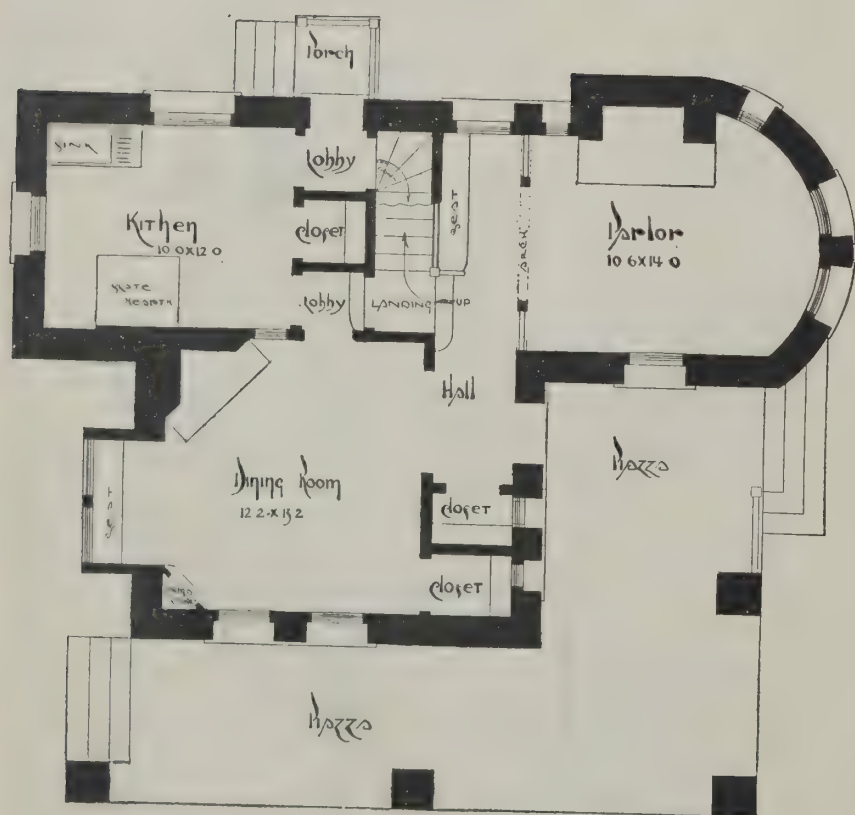
A RESIDENCE AT BELL HAVEN PARK.



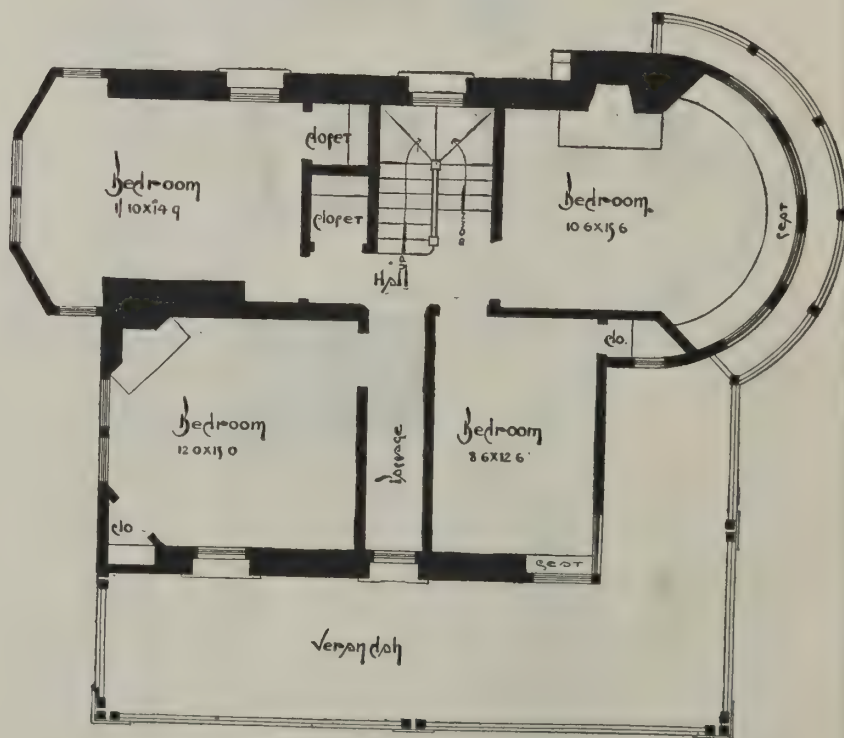
A DWELLING FOR \$4,000.



A SUMMER COTTAGE FOR \$1200.



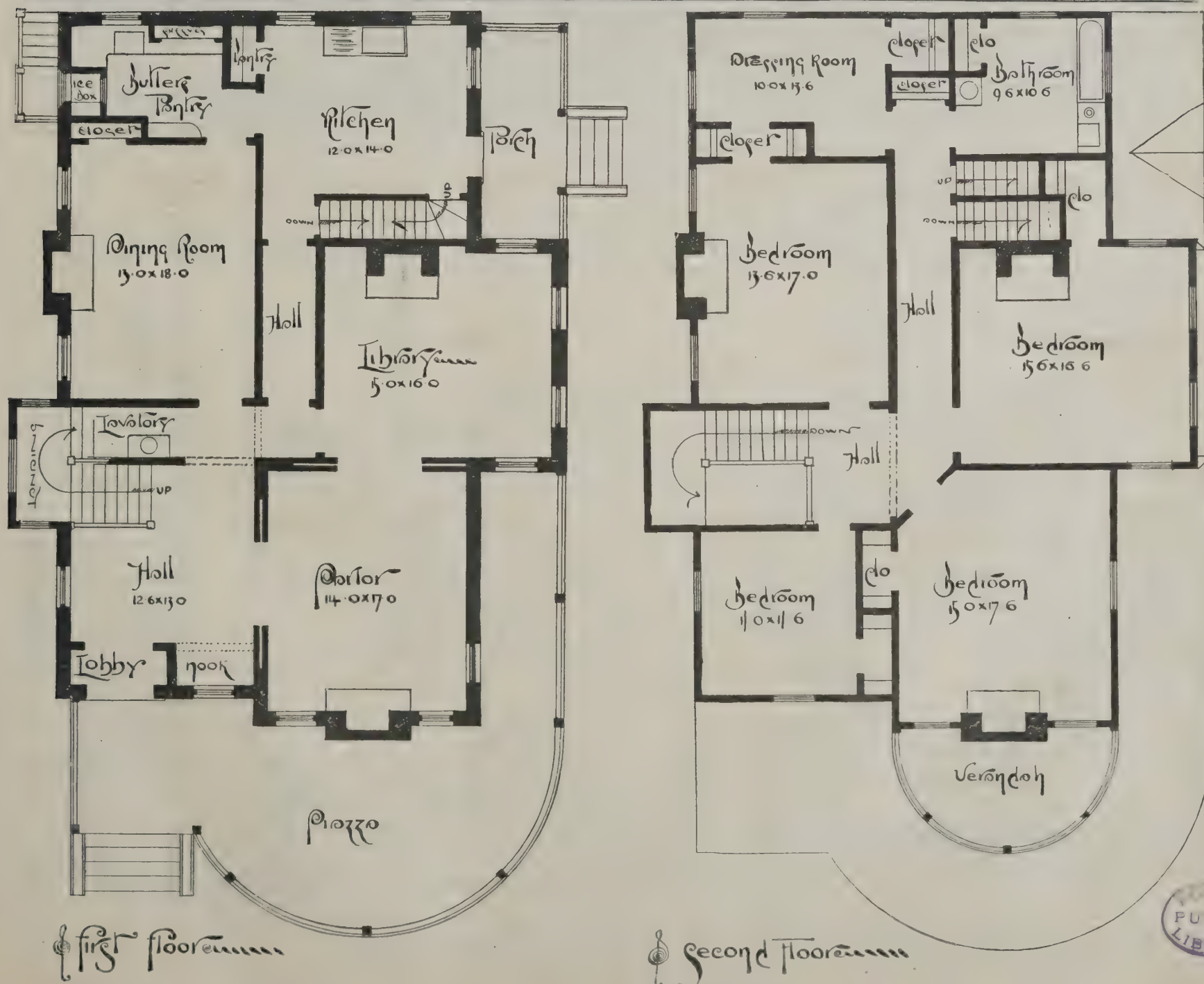
* First Floor



* Second Floor

A MOUNTAIN COTTAGE.





A DWELLING AT SPRINGFIELD, MASS.

THE RAILROAD STATION AT AUBURNDALE, MASSACHUSETTS.

The station at Auburndale, near Boston, on the line of the Boston and Albany Railroad, has a peculiar interest as being the first of the series erected by the late H. H. Richardson, architect.

It is almost needless to explain that until Richardson began to build rural railroad stations, none had been erected in America which deserved much consideration as intelligent and pleasing works of art. Among our great city termini a few existed which were reasonably appropriate to their purpose in external appearance as well as admirably planned for the convenience of train men and passengers. But the best of our small country stations were plain, cheap structures, looking no more like stations than like buildings of some very different kind, while the average varied between grotesque and fragile attempts at picturesqueness of aspect and shabby makeshifts disgracing the very name of architecture. We had vulgar little stations that looked like exaggerated kiosks, and brick or wooden boxes which merely displayed the railroad company's desire to expend as little money as possible; but no rural stations that gave pleasure to the passing traveler's eye, accommodated him comfortably while he was waiting for a train, or showed that an architect worthy of the name had had a hand in their erection.

No problems, however, appealed more strongly to Richardson than those which were utilitarian in character; none delighted him more than those which had hitherto been neglected by art; and he was as eager to put his best thought into small problems as into large ones.

Therefore, when the Boston and Albany Railroad Company asked him to design their station at Auburndale, he showed for the first time what such a building ought to be. The plan, of course, in so small a station is very simple, there being but two waiting rooms, of almost equal size, for men and women respectively. But the rooms are well proportioned and the ticket office is well placed, projecting as a prettily designed bay upon the platform.

The interior walls are wainscoted with brick, as being cheap, durable, pleasant to the eye, and easily kept clean.

The woodwork is simple throughout, but, although no carving exists, it is carefully distributed and profiled, and gives a look of refinement very different from the parsimonious nudity or the cheap elaborateness which the average country station shows. Here, as well as in the architectural features proper, we feel that the hand of an artist has been at work.

Simplicity, dignity, and solidity likewise characterize the exterior of the building, while its outlines and proportions are such that its true purpose could not be mistaken.

A station is not a house to live in, but a house to wait in—a mere temporary shelter. The roof, therefore, not the walls, should dominate in its expression, and this prime fact Richardson never forgot, no matter what was the size of the station he was designing.

The walls at Auburndale are low, and their windows are not conspicuously emphasized; but the roof is broad and massive, and the adjacent sheds are not mere adjuncts, but integral parts of the building, their roofs being vitally united with its own.

In a dwelling house a more ornate chimney would have been appropriate as accenting the importance of the family fireside, but nothing could be better on a railroad station than Richardson's simple chimney.

An interesting point is the design of the wooden posts which support the sheds. Here again there is no ornament.

But the plain square-sectioned posts with their massive braces, affording three points of support to the beams, admirably express the nature of the material, and the slightly curved form of the braces prevents any look of stiffness or monotony in outline.

The roofs of the sheds are open, showing the timbered construction. The walls of the station are of

part and parcel of nature's handiwork. In summer this effect is the most charming that can be produced in a rural situation, while even in winter the delicate tracery of the naked vines and the bare masses of the shrubs preserve it to a considerable degree. No detail better shows Mr. Olmsted's good taste than the way in which, in laying out his path, he permitted planting close to the walls.

A single tree placed by the carriage porch—which admits to the women's waiting room—already groups agreeably with its roof, and in future years will be still more effective, throwing its shade over the spot where the idea of shelter is most conspicuously emphasized by the lines of the building itself.

A subway runs under the tracks to a strip of lawn on the opposite side, which has its fence "planted out" with shrubs, thus affording the traveler a pleasant, verdurous prospect whichever way he may turn his eyes.—*Garden and Forest.*

The Railroad in Horticulture.

The service which the railroad is capable of performing in the development of horticultural taste and knowledge is considerable. Every inhabitant of a town visits the railroad station, and if the town is in the neighborhood of a city, a considerable portion

of the population passes through the station six days out of seven. The impression it makes, therefore, is powerful and lasting.

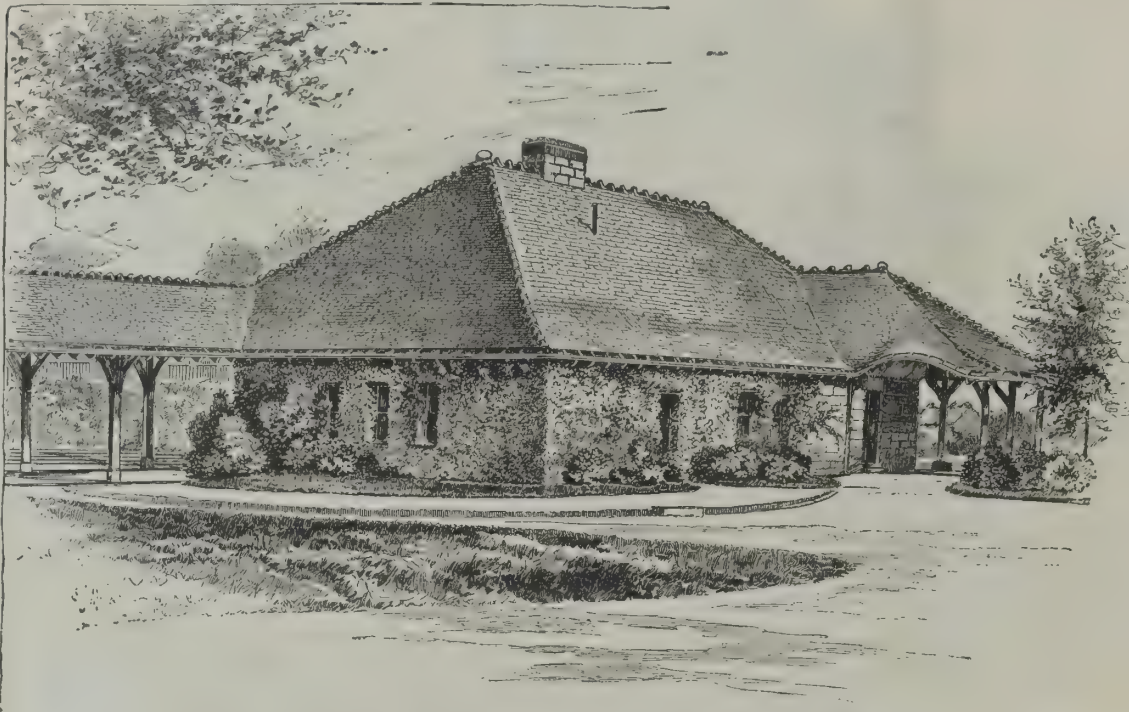
Railroad managers, or some of the more far sighted among them, long ago perceived that a well built and well equipped station is the best advertisement that can be set up in a country town, and that the first impressions received by a stranger in arriving by rail have much to do in determining his choice of a home, and railroad gardening has, therefore, come to be considered a necessary part of construction and maintenance among prosperous and progressing companies seeking to develop local passenger business.

It must be confessed, however, that up to the present time railroad gardening has failed, with few exceptions, to accomplish what the public has a right to expect of it, from an artistic point of view; and that instead of using their opportunities for increasing the taste and knowledge of the communities they serve, railroad managers have generally been satisfied to reproduce all that was glaringly bad in the prevailing horticultural fashion of the time. This was, perhaps, inevitable, and it will be inevitable so long as men trained in other pursuits and engrossed in absorbing occupations feel that in these matters of taste and special knowledge they need not call for the advice of an expert of a higher class than the ordinary jobbing gardener. It is the old story—a man employs an architect to build his house, but thinks he needs no advice in laying out the park that surrounds it.

The principles which underlie good railroad gardening are simple. They relate—so far as such gardening has yet been attempted—to the improvement of the immediate surroundings of country stations and to the shaping and turfing of the slopes rising or falling from the permanent way.

The essential features in the surroundings of a station are: convenient and abundant approaches, and some treatment of the ground not needed for the approaches. This treatment should be at once economical and permanent, and of a character simple enough to be successfully maintained by the station master and his assistants, under the inspection and with the occasional advice of a higher officer charged with the management of the horticultural affairs of the corporation.

(Continued on page 87.)



AUBURNDALE STATION, BOSTON AND ALBANY RAILROAD.

granite, trimmed with red sandstone, and the roofs throughout are slate, with terra cotta ridges.

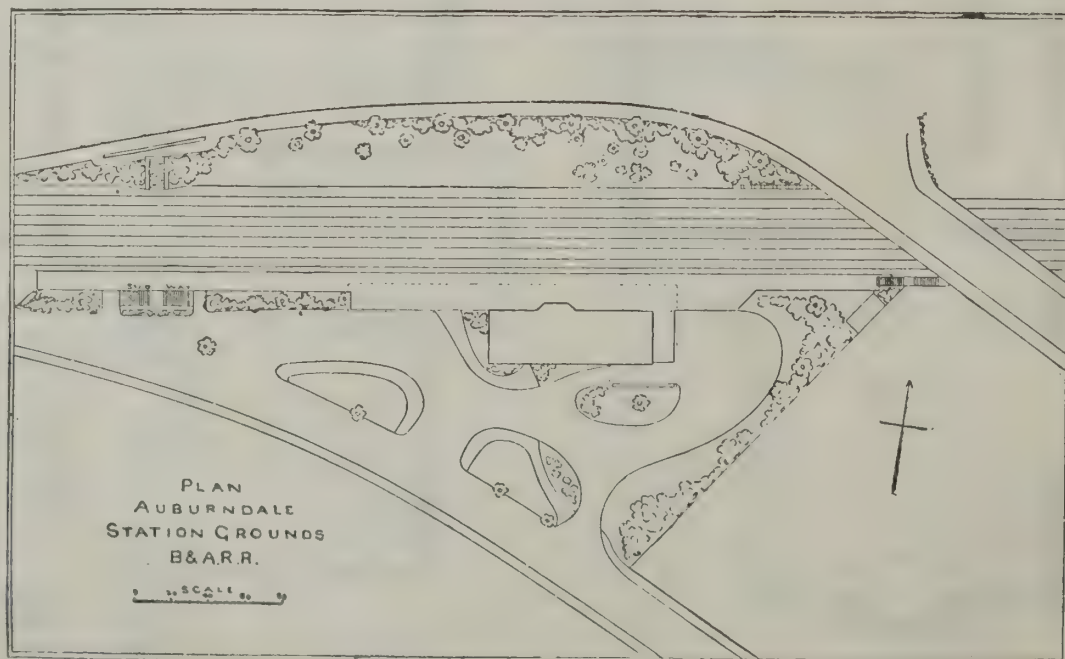
But a station like this would be shorn of half its comfort and beauty were it placed and surrounded as the American country station usually is. The railroad company was as wise in asking Mr. Frederick Law Olmsted to design its grounds as in asking Richardson to build it.

Whatever the art, and however small the problem, only the best talent can produce the best result. If the accompanying plan is studied for a moment, its excellence will make itself plain.

The high road passes obliquely by the station, and from it, toward the right, diverges the approach in an easy curve, while near the porch underneath which passengers alight is a wide space for turning, and the little lawns are so disposed toward the left as to admit of the passage of numerous vehicles without danger of overcrowding.

A pathway encircles the station, and the platform may thus be approached, without entering the building, either on foot or in a carriage.

Under the superintendence of Mr. E. L. Richard-



PLAN OF AUBURNDALE STATION GROUNDS, BOSTON AND ALBANY RAILROAD.

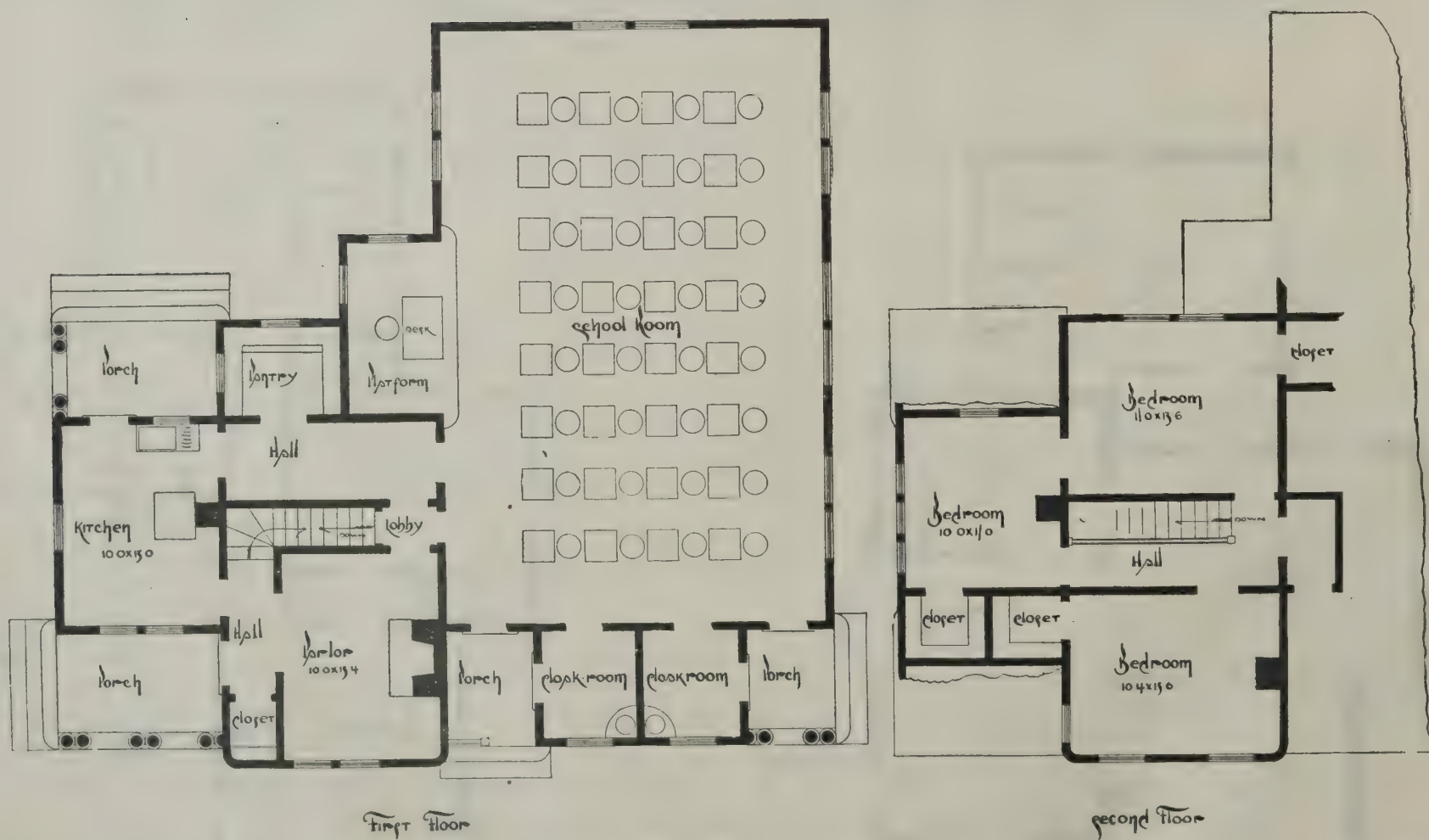
son, who has charge of all the horticultural concerns of the Boston and Albany Railroad, these lawns have been covered with neat turf and adorned with hardy flowering shrubs, naturally disposed, yet grouped in effective masses.

The boundary fence to the right is hidden by shrubbery, and masses of it are so disposed around the walls of the building that, with their luxuriant covering of Japanese ivy (*Ampelopsis vitifolia*), they almost seem

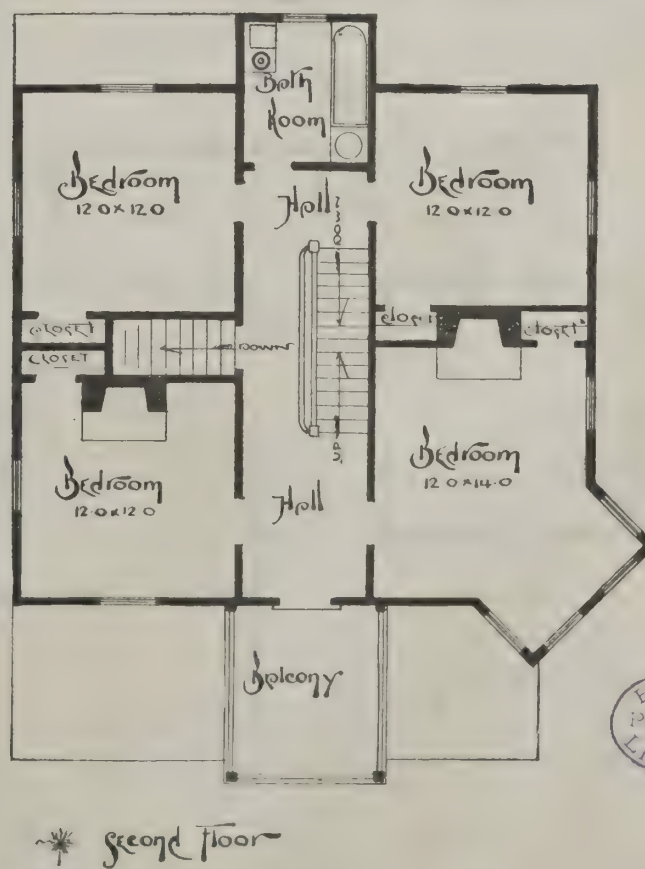


A RESIDENCE AT ROSEVILLE.





COMBINED SCHOOL HOUSE AND COTTAGE.



A RESIDENCE AT SPRINGFIELD, MASS.

EDUCATION
PUBLIC
LIBRARY



A COTTAGE FOR \$6,750.

The Railroad in Horticulture.*(Continued from page 82.)*

The selection of a general system of treatment is the only difficult part of the undertaking, and it is here that railroad managers have usually failed. Most railroad gardens—and this is as true of Europe as of America—consist of a badly laid out and constructed approach, bordered with turf in which are cut as many large and often grotesquely-shaped beds as can be crowded in, filled during four months of the year with the most showy and ill-assorted plants and quite bare of all covering during the remaining eight months; of a few shrubs, mutilated almost past recognition by bad pruning; and a clump of pampas grass to complete the decoration.

Not infrequently this arrangement is varied by the introduction of the name of the station printed in bold characters with large white stones, or by pattern beds of gay colored sand or pebbles—mere "toys," as Bacon wrote three centuries ago, "you may see as good sights many times in tarts."

Station grounds thus arranged are not artistic, and therefore are bad from the point of view of the public. They are enormously expensive and difficult to maintain, and therefore are bad from the point of view of the railroad.

It is evident that no railroad corporation, however prosperous, can go on year after year decorating station grounds on a system which requires a large annual outlay. If railroad gardening is ever to become a potent and permanent means of public education, it must be organized upon a more economical basis, and with more regard to the laws of good taste and of good business than has yet been shown in the United States or in Europe.

This is a subject which has, however, occupied the attention of a few thoughtful men, and we feel confident that some progress has at last been made in railroad gardening—a view which will perhaps be confirmed by an examination of the picture of one of the suburban stations recently built by the Boston and Albany Railroad, which we publish herewith.

The grounds surrounding these stations have been laid out with a view to convenience, neatness, and simplicity. They contain no beds of brilliant flowers, and make no attempt at startling effects. They rely for their attractiveness upon convenient and well kept roads, neat turf, a few good trees, and masses of well selected and well planted flowering shrubs, among which herbaceous and bulbous plants are allowed to grow. The scheme is simple and, when thoroughly carried out in the beginning, is easy and inexpensive to maintain. And as true art, which consists in adapting any creation of this sort to its surroundings and to the requirements of everyday life, always impresses itself in the long run upon those who are brought in contact with its results, these simple station yards are already exerting an influence which is shown, in the communities of which they are the centers, in a truer appreciation of what is most beautiful in gardening.

The best scheme for treating railroad slopes and banks has not yet been worked out. The two extremes are the carefully graded and turfed bank, generally adopted in England when railroads were first built, and the rough, gullied slope, usually bare of vegetation or covered with an occasional growth of native shrubs which do not long escape the annual butchery of the track gang. Some system intermediate between these two extremes is needed. The turfed slope, in spite of all the money that has been expended upon it, has not been successful even in England, where the climate is much better suited to the development of good turf than in any part of the United States. The grass slopes there are now generally in a bad condition, cut with gullies, filled with weeds, and really less satisfactory than if nature had been left to shape and cover them according to her own devices.

At least one company in this country has expended enormous sums of money in grading and turfing its slopes, but the result, as might have been expected, is even less satisfactory than it has been in England—our hot sun and long droughts keep the turf brown through the greater part of the year, even when they do not kill it entirely. What is needed is a covering which will be more permanent than turf, which will not require the constant cutting and attention that turf requires, and which can be secured without the excessive first expenditure for accurate grading and the deep soil that are needed to make a grass-covered slope presentable.

It has been suggested that a railroad slope covered with dwarf, hardy shrubs would be more secure and would look better than one covered with turf of the poor quality which is all we can hope to secure in our climate in such positions. The value of this suggestion lies in the fact that such shrubs as might be used—wild roses, dwarf willows and sumachs, sweet fern, bayberry and several others—would, when once established, prevent the surface soil from washing, would not grow tall enough to interfere with operating the road, and, if destroyed by fire, would grow again from the roots and soon cover the ground.

There can, of course, be no doubt that a bank cov-

ered with any of these shrubs would present a more inviting and pleasant appearance to the eye of the traveler than a stretch of such turf as can be grown without great expense for annual renewals and for mowing, rolling, and watering. The Boston and Albany Railroad corporation has recently established nurseries near Boston, in which large quantities of native shrubs are now grown, with a view to testing the possibilities of covering with them the slopes in its suburban division. These experiments will be watched with much interest.

A MOUNTAIN COTTAGE.

The cottage represented in the engraving was erected for Edward Pierson, Esq., of St. Cloud, Orange, New Jersey. Architect, Mr. Arthur D. Pickering, New York.

This house is of a somewhat interesting character, from the manner in which it is constructed and the attractive novelty of its design.

Foundation built of stone, with an underpinning. First story, also front and rear walls and second story, built of brownstone, laid at random in red mortar, the balance of second story being of wood; the exterior is covered with shingles. Roof shingled.

Hall finished in cherry. Staircase, newels, posts, baluster, and rail of cherry.

Parlor finished in cherry, and has a large old-fashioned fireplace, with tile hearth.

Dining room finished in oak; kitchen wainscoted.

Four bedrooms on second floor; two rooms finished off in attic, and storage room.

There is a cemented cellar under whole house.

The floors are of ash, laid in narrow widths.

Our perspective was prepared from a photograph of the cottage taken especially for the Architectural Bureau of the SCIENTIFIC AMERICAN.

A DWELLING AT SPRINGFIELD, MASS.

Half brick and frame house, built for Enos Smith, Esq., at Springfield, Mass., J. D. & W. H. McKnight architects.

The house has spacious rooms, handsomely finished, complete in every respect.

Foundation, stone. First story, selected brick, and stone trimmings. Second story of wood, covered with clapboarding and cut shingles. Roof slated.

The principal rooms on first floor are provided with open fireplaces.

The parlor and library are finished in cherry. Dining room and hall are finished in quartered oak. Ornamental staircase, furnished with glazed stained glass. Under stairs there is a lavatory.

The butler's pantry and kitchen are finished in ash, wainscoted.

Large bed rooms on second floor, provided with large closets, and a large dressing room.

The trim and woodwork on this floor is of ash.

There are four large bed rooms on third floor or attic, provided with closets, etc., and a billiard room 15 x 29.

The cellar is cemented, and contains a laundry and furnace.

The house was erected at a cost of \$8,500, complete.

Our engraving was made direct from a photograph of the building made especially for the SCIENTIFIC AMERICAN.

A RESIDENCE AT ROSEVILLE.

Our illustration represents a house just completed for Mrs. J. C. Mott, at a cost of \$8,500, at Roseville, N. J., John E. Baker architect, Newark, N. J. The engraving was made direct from a photograph of the building especially taken for the SCIENTIFIC AMERICAN.

The foundation is of stone, underpinning and first story of broken bluestone, with jambs and arches of brick. The second story is covered with shingles. Octagonal cut slate roof.

Cemented cellar under whole house.

Hall finished in oak. Staircase of oak. Arches separate the principal rooms. The intention is to use portieres. Parlor and dining room are provided with sliding doors.

Parlor finished in cherry. Dining room finished in oak, similar to hall. The smoking den finished in butternut. Kitchen wainscoted.

Five bed rooms on second floor, provided with ample closet room, fitted up with shelves and drawers, complete.

Bath room wainscoted similar to kitchen.

The first floor is laid in narrow widths of oak and cherry.

The house is piped for gas.

COMBINED SCHOOL HOUSE AND COTTAGE.

We give an illustration of a combined school house and country cottage erected at St. Cloud, Orange, N. J., Arthur D. Pickering architect, New York.

The idea in this design is the utilization of one-half of the lower portion of this building as a school house, the dwelling being distinct. If desired, it can be connected by a door leading into a passageway that opens into the principal rooms.

This building has a picturesque appearance. Exterior throughout is covered with shingles.

There is a cellar under house, with foundation and underpinning of stone, except under the school house. The cellar is cemented and contains furnace and laundry room.

The trim throughout, white pine, finished in the natural. The floors throughout are of ash laid in narrow widths.

Second floor has three bed rooms, provided with closets, fitted up in the usual way.

The school room is 24 ft. x 40 ft., with seating capacity for thirty-two pupils.

Cost, \$4,700.

Our engraving is made direct from a photograph of the building taken especially for the SCIENTIFIC AMERICAN.

A RESIDENCE AT SPRINGFIELD, MASS.

We give an illustration of the residence of Henry A. Chapin, Esq., Buckingham Place, Springfield, Mass., J. D. & W. H. McKnight architects.

It is attractive in appearance and convenient.

The exterior is covered with beveled white pine clapboarding. The roof shingled.

The trim throughout is of ash finished in the natural.

Hardwood mantels are furnished. Staircase leads to second floor and attic.

Butler's pantry is fitted up with dressers, shelves, and drawers.

The kitchen is wainscoted.

The laundry is fitted up in cellar. Furnace is provided.

Four large bed rooms on second floor, and bath room. Two bed rooms have open fireplaces. Bed rooms are provided with ample closet room. Bath room is wainscoted.

Two other rooms in attic, and storage room. Cost, complete, \$3,500.

Our engraving is made direct from a photograph of the building taken specially for the SCIENTIFIC AMERICAN.

A COTTAGE FOR \$6,750.

We give an engraving of a cottage built at Roseville, N. J., for F. J. Stevens, at a cost of \$6,750, F. W. Ward architect, New York. The illustration was made direct from a photograph of the building especially taken for the SCIENTIFIC AMERICAN.

The elevations have pleasing features.

Foundation of stone, underpinning of brick. The exterior to the first story is covered with beveled clapboarding. Second story with shingles. Roof is covered with octagonal cut slate.

There is a cemented cellar under whole of house.

Hall is finished in ash. The parlor is finished in cherry. The library is finished in oak. Dining room finished same as library. Kitchen is wainscoted. Kitchen is provided with pantries, fitted up in the usual way. The rest of the trim is of whitewood.

There are four bed rooms on second floor, provided with large closets, fitted up with shelves and drawers.

A COTTAGE AT HOLYOKE, MASS.

This cottage was recently erected for Howard A. Crafts, Esq., at Holyoke, Mass., at a cost of \$3,100 complete. G. P. B. Aldeman architect.

It has a good arrangement of rooms, with attractive exterior, which is covered with clapboarding and shingles. Roof shingled.

The library has an octagonal projection that runs up two stories, and is provided with a fireplace, tile hearth, and a handsome hardwood mantel.

The trim throughout is of whitewood, and the hall, parlor, and library are finished in cherry; the rest are finished in the natural.

The kitchen is wainscoted; large pantries fitted complete.

Five bedrooms on second floor, provided with closets, etc.

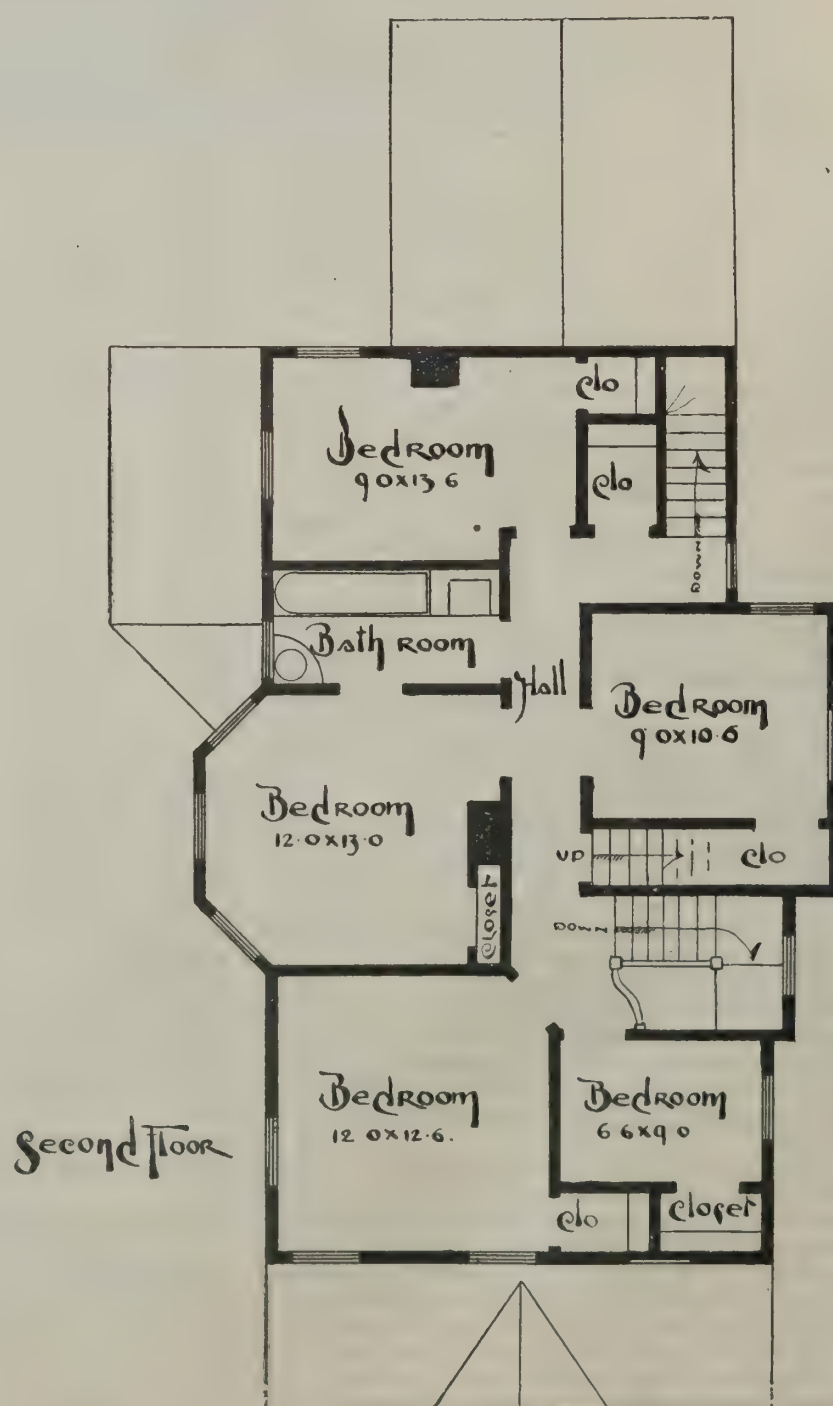
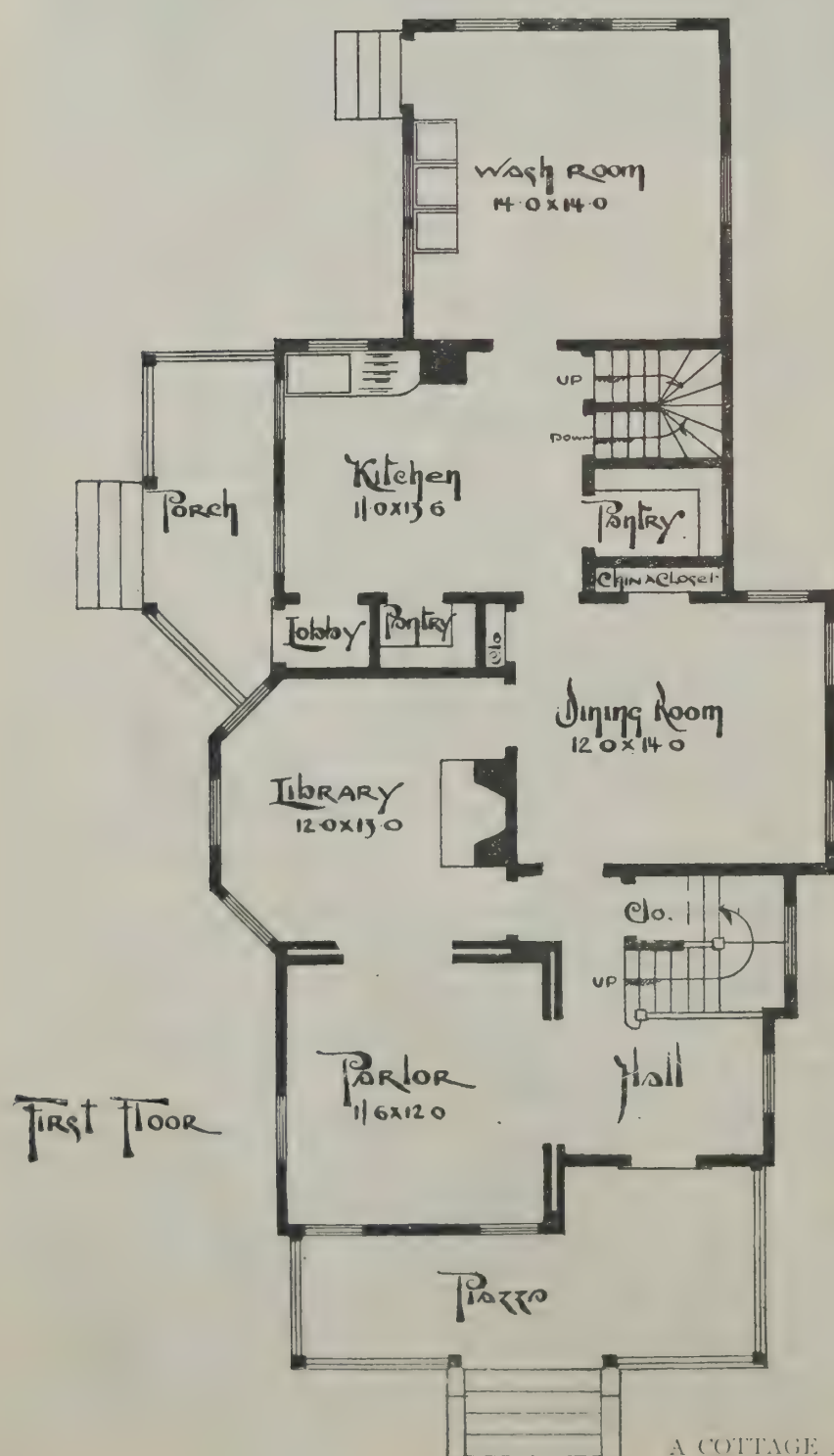
The bathroom is wainscoted.

There is a cellar under whole house, cemented, and contains heating apparatus.

If necessary, three nice rooms can be finished off in the attic.

Our engraving is made direct from a photograph of the building taken especially for the SCIENTIFIC AMERICAN.

If any of our readers have made an invention for which they have thoughts of taking a patent, they are invited to communicate with Messrs. Munn & Co., the publishers of this paper, who for a period of forty-three years have conducted a most successful bureau in this line. A pamphlet of instructions will be sent free, containing full directions how to obtain a patent, costs, etc. In very many cases, owing to their long experience, they can tell at once whether a patent probably can be obtained; and advice of this kind they are always happy to furnish free of charge. Address Munn & Co., SCIENTIFIC AMERICAN office, New York.

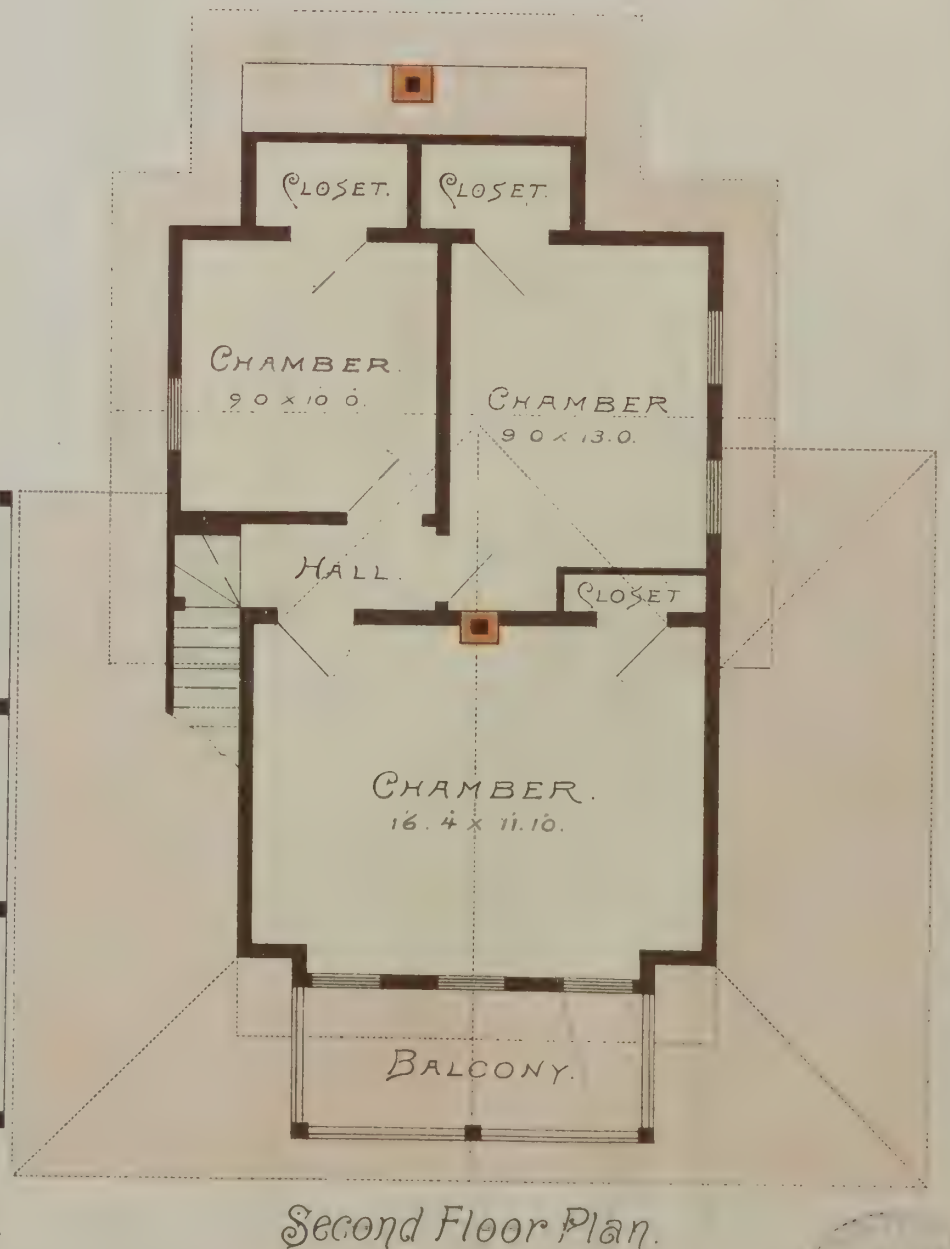
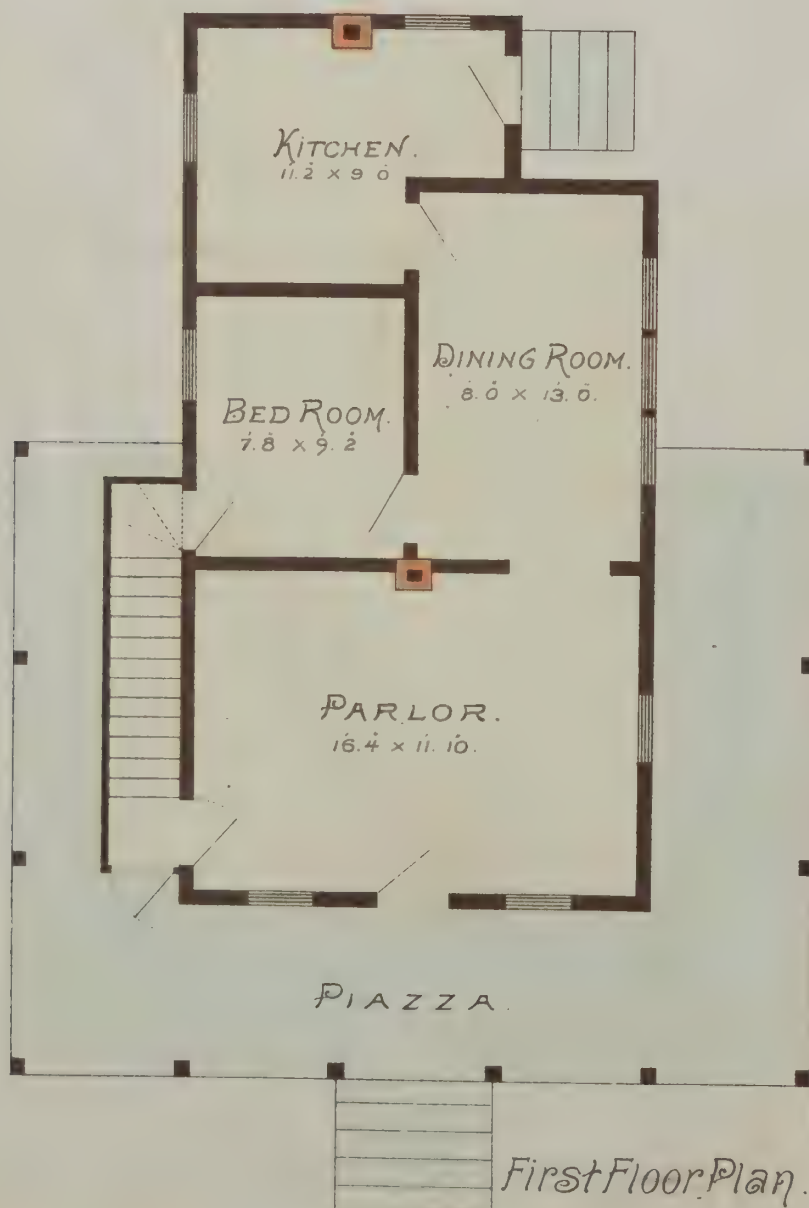


A COTTAGE AT HOLYOKE, MASS.



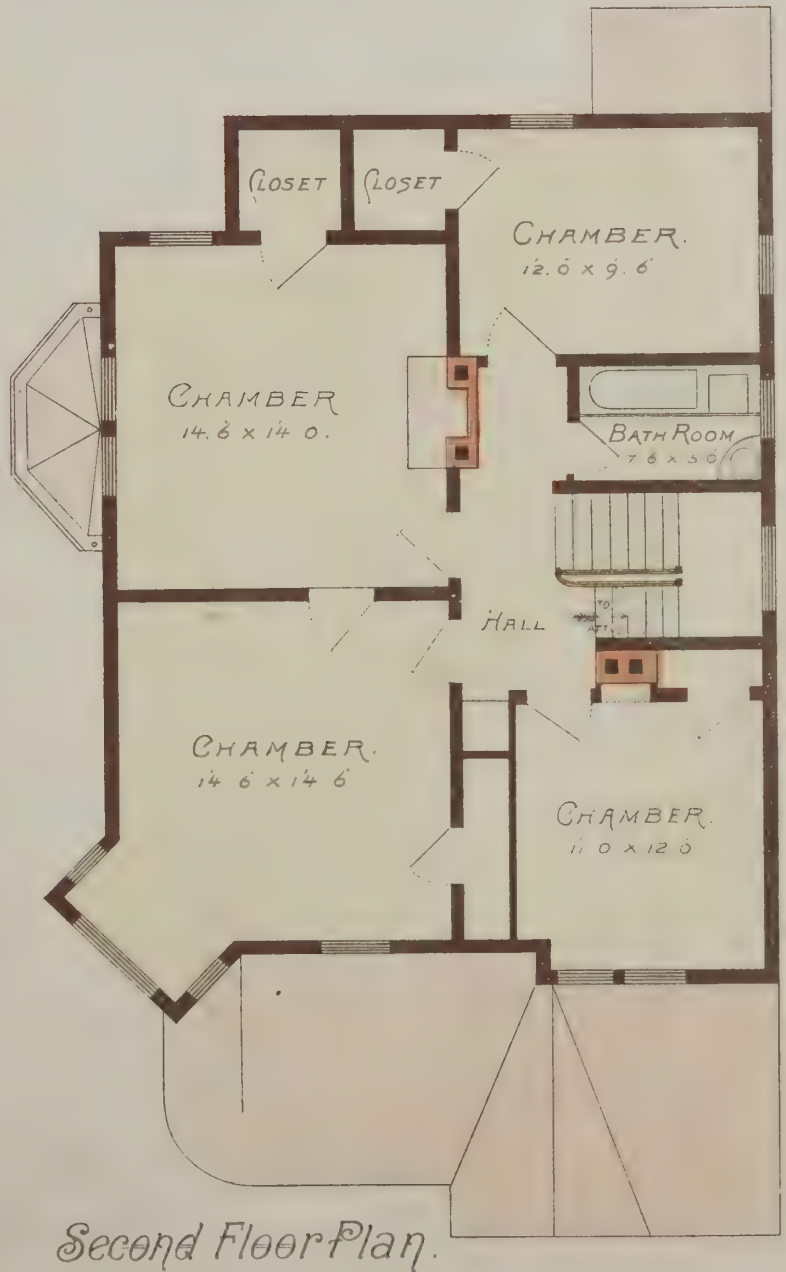
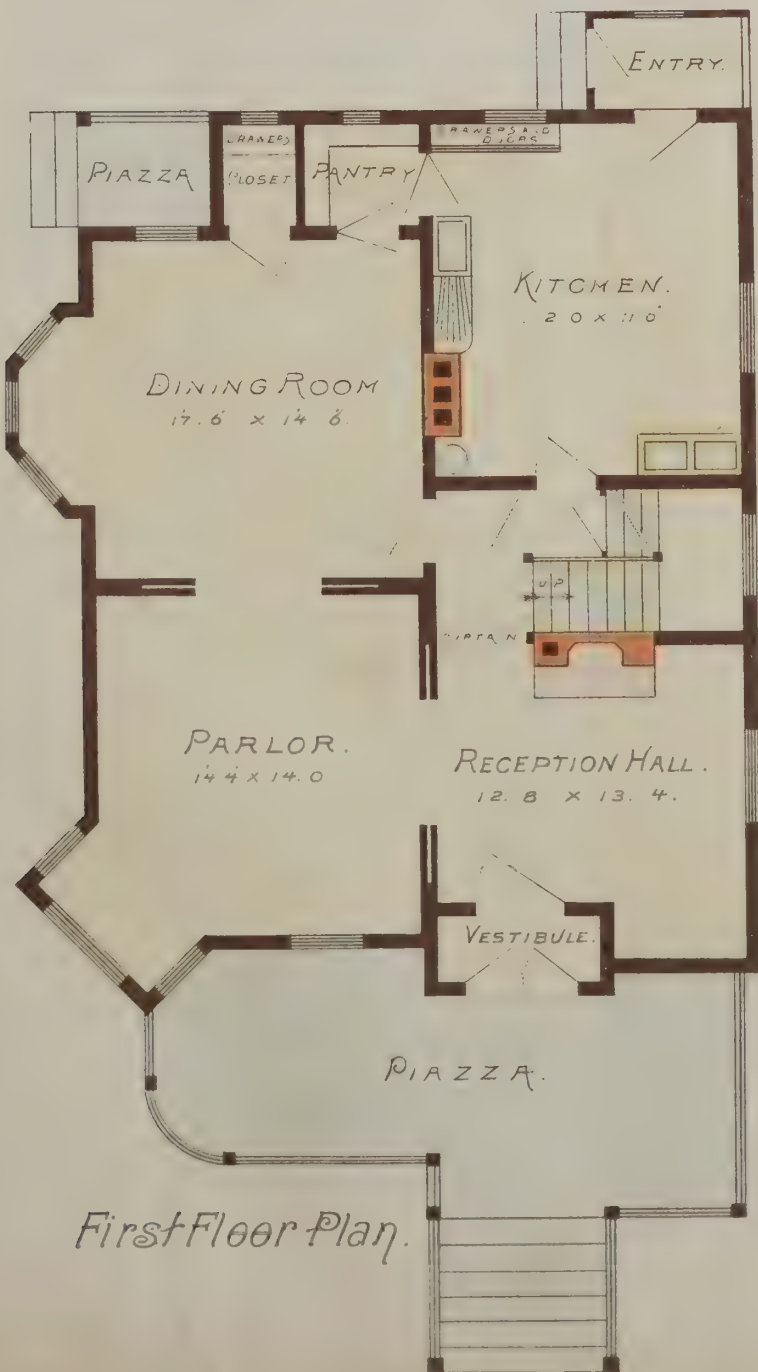


A SUMMER COTTAGE FOR TWELVE HUNDRED DOLLARS.





A DWELLING FOR FOUR THOUSAND DOLLARS.



THE IMPROVED "ECONOMY" FURNACE.

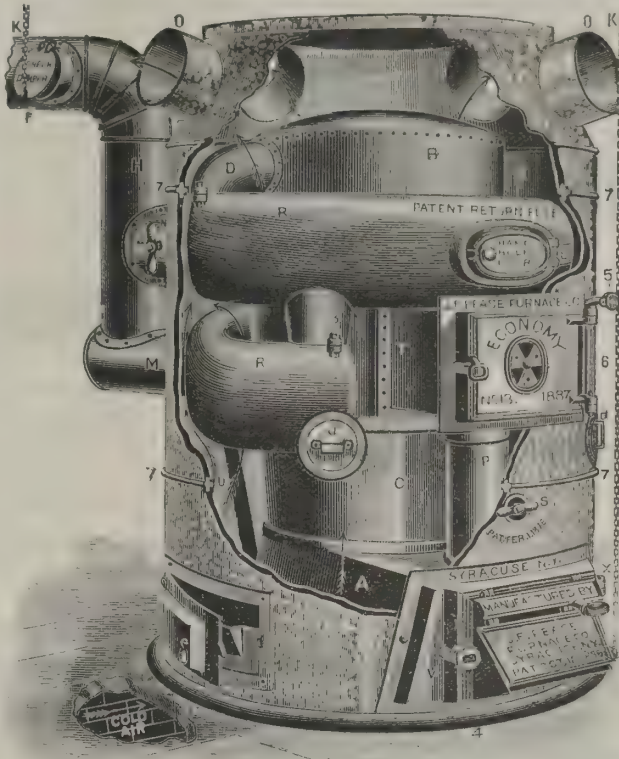
The accompanying cut illustrates an improved double radiator warm air furnace which was put on the market by the J. F. Pease Furnace Co., of Syracuse, N. Y., some time since. The heater was patented in 1886, and has since been put to a substantial test. After a most thorough trial of three winters in all Northern climates, it is said to have fulfilled every expectation. The general characteristics of this heater are, in the main, similar to those of the regular pattern Economy furnace. It possesses the same advantageous features of economy, durability, and cleanliness, the only essential difference being that, in the place of the one flat warm-air radiator of the regular Economy, it possesses two cast iron connecting radiators, with an indirect and direct draught pipe.

The furnace is surrounded by a galvanized iron casing, held in position by the cast casing rings, 7 7, and is provided with an inside lining with an air space between, to more effectually retain the heat and prevent waste by external radiation.

The fire pot, C, resting on the ash pit, A, is surmounted by the combustion chamber, B, with a heavy wrought plate steel dome, constructed to stand any degree of heat necessary. This combustion chamber is surrounded by two cast iron radiators, R R, each cast in one piece and fitting to each other by cup joints at 3 and D, as shown in cut. These radiators are segmental in form, terminating at opposite sides of the combustion chamber, thus forming the only perfect return flue furnace ever yet made. The upper radiator is attached at its ends to the combustion chamber, B, by the ducts, D D, and the lower one is connected at its ends to the upper one in a reversed manner. Both radiators are connected to the smoke pipe, H, by the indirect draught pipe, M, and the direct draught pipe, N, in which the damper, 2, allows the product of combustion a free and direct access to the smoke flue when starting a new fire, or forces it around through both radiators after the coal is well ignited and the gases are thrown off.

This construction admits of a free circulation of the air (coming in from the cold air duct) between the radiators and at the sides adjacent to the combustion chamber, and on the interior of the radiators forms a course for the product of combustion that is not only circuitous, but also partly downward, thereby retard-

after ascending into and filling the chamber, B, which also constitutes an efficient radiator, passes through the ducts, D D, and descends into the radiators, R R, where, after yielding the greatest portion of heat, it finally escapes through the exit flue, M, thus utilizing the



IMPROVED "ECONOMY" FURNACE OF THE J. F. PEASE FURNACE CO.

product of combustion to the utmost extent possible with a warm air furnace, and consequently obtaining from the consumption of fuel the greatest result in radiated heat. Care is exercised in the construction of this furnace to make it absolutely gas tight, which prevents the escape of any of the impurities and odors of the combustion into the warm-air chamber.

A late catalogue, containing full illustrations and descriptions of this popular heater, will be sent on application to the Pease Co., at their offices in Syracuse;

the most charming of the many picturesque spots in the vicinity of New York. The institution was established in its present location in 1853.

To these buildings the Mallory Standard Shutter Worker has recently been applied. This shutter worker is a mechanical contrivance which opens and closes the blinds without raising the window, locks the blinds in any position, and prevents all slamming and breaking. It is so simple that a child can operate it; there is no opening of the windows or dangerous leaning out to release an obstinate catch. The working parts are incased so as not to be affected by rust, snow, ice, or dust, thus insuring long wear and durability, and the principal parts are of malleable iron. It is manufactured by F. B. Mallory, Flemington, New Jersey.

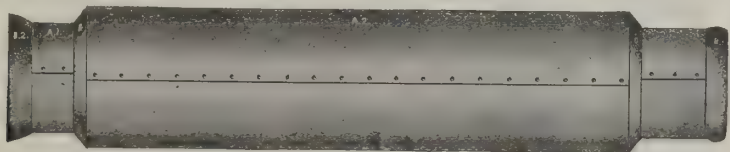
WROUGHT IRON AND CEMENT-LINED PIPE.

This description of pipe, manufactured by the Pennsylvania Pipe Manufacturing Co., of Germantown Junction, Philadelphia, has been proved to be admirably adapted for all underground uses; as for water, gas, petroleum, drainage, and sewerage purposes. It has particularly been shown to be especially advantageous as a pipe for water mains, such pipe being entirely free from the main objections inherent to cast iron, in which the growth of tubercles and the corrosion of the iron always cause in time a serious reduction in the interior diameter of the pipe, to say nothing of the fault to be found therewith when the matter is looked at from a sanitary point of view.

This pipe is made with an inner wrought iron cement lined shell, such shell likewise having an outer coating of cement, held in place by an outer iron jacket, the inner wrought iron shell of the pipe thus being secured by a positive coating of cement on both sides.

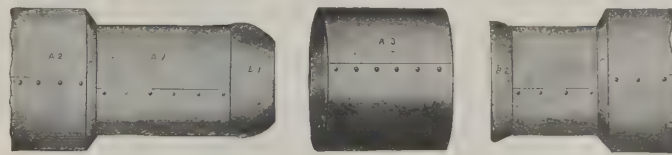
The manner of making the joints and connections is very simple, the joint becoming equal to the body of the pipe in strength, and being practically its continuation.

This cement-lined pipe in use acquires a glassy interior surface, which greatly facilitates the flow of water, and acts to prevent the accumulation of any deposits, a difficulty constantly being met with in cast iron pipes. Only the best quality of wrought iron is used in the pipe, the thickness of which is proportioned to resist the strain to which it is to be subjected, all pipe furnished being tested far beyond any strain it is like-



A 1. Inner wrought iron pipe. A 2. Outside wrought iron jacket. B 1. Male end. B 2. Female end. C. Cement.

Fig. 1.—SHOWING PIPE COMPLETE AND READY FOR THE TRENCH.



A 1. Inner wrought iron pipe. A 2. Outside wrought iron jacket. A 3. Wrought iron sleeve. B 1. Male end. B 2. Female end. C. Cement.

Fig. 2.—SHOWING THE WROUGHT IRON SLEEVE AND THE ENDS BEFORE CONNECTING FOR JOINTING.

ing its escape until nearly all the heat is radiated. The upper radiator can easily be cleaned through the hand hole door, E, and the lower radiator through the radiator clean-outs, a a, and a door in the rear of the draught pipe, M (not shown in cut). This cleaning should be done in the spring, as soon as the fire is out for the season, or it may be quickly done at any time. O O are the ducts connecting to tin pipes leading to the registers. The number of these pipes varies, of course, according to size of furnace and number of rooms to be warmed. On the smoke flue, H, is located the check damper, F, opened and closed by a small chain, K, which runs to any part of the building from which it may be desirable to control the furnace. The draught damper, G, is likewise controlled from above by another chain, K.

A very effective and convenient means of preventing the escape of dust through the ash pit door while shaking the grate is obtained by the patent dust pipe, P, extending from the top of the ash pit and communicating directly with the combustion chamber through the feed chute, and is regulated by the damper, S, which is kept closed except when shaking the grate. During that operation it is opened and the ashes are drawn up through this pipe into the combustion chamber by the draught.

The product of combustion,

206 Water Street, New York; or 75 Union Street, Boston.

THE ACADEMY OF MOUNT ST. VINCENT, ON THE HUDSON, N. Y.

The illustration herewith represents a famous educational institution on the banks of the Hudson, near the extreme northern boundary line of New York City. The grounds are most attractive, and the site is one of

ly to be called upon to stand. The best brand of hydraulic cement is used, and the composite pipe thus formed is adapted to stand the roughest handling in freight cars or on trucks, its lessened weight making the work of laying such pipe less difficult than that of laying cast iron pipe of the same capacity. The pipe also admits of being readily laid in curves, and can be easily cut without waste for making short turns.

The superintendent of the Schenectady (N. Y.) Water Works, in his report for 1886, says of this cement-lined pipe:

"The system of cement-lined pipe, if properly laid, should be preferred to cast iron. In reaching this conclusion, I take into consideration the object of greatest moment to our citizens—health. At no examination has there been found any deposit in the pipes which a flushing of the mains would not remove. I have found in almost every instance, upon removing the cement coating, the iron bright and firm as at the time of laying, fourteen years ago."

This system of cement-lined pipes is now in use in many leading cities, New Haven, Conn., alone having laid some eighty miles of it, its authorities indorsing it as not only greatly superior in every respect over all other forms of water pipe, but as being also more economical. Would also add that this pipe is now laid



THE ACADEMY OF MOUNT ST. VINCENT, ON THE HUDSON, N. Y.

in the following places, with the best results: West Haven, Conn.; Elizabeth, N. J.; Moorestown, N. J.; Derry, Pa.; Greensburg, Pa.; Bridgeport, Conn.; Danbury, Conn.; Stamford, Conn.; Middletown, Conn.; Laconia and Lake Village, N. H.; Ansonia, Conn.; Amoskeag Mills, N. H.; Pittsfield, N. H.; Manchester, N. H.; and many others.

SHEATHING AND LATH COMBINED.

The illustration herewith represents a section of sheathing and lathing combined, which has been patented by Mr. Theodore F. Timby. It is claimed that two coat work on this lath is better than three on common lath. The deep kerfs in the back pass the bottom of the face grooves, leaving no solid wood on a center line through the board, from edge to edge, thus fully overcoming the possibility of expansion or contraction in the width of the board by the application of moisture or heat after the same has been nailed to the joist or studding. It is a perfect sheathing and lath, so constructed that each individual lath may swell or shrink without affecting those on either side of it. A perfect fishtail clinch is forced by the wedge in the center of groove. Picture nails can be driven anywhere. One third of the studding is saved in partitions. Used outside as a sheathing, and back-plastered between the studs, it makes a frostproof wall. The "Timby" improved sheathing and lath combined is manufactured in six inch strips, both edges finished alike, as shown by the illustration. For further particulars, address Manhattan Hardwood Lumber Co., No. 32 Warren Street, N. Y. City.

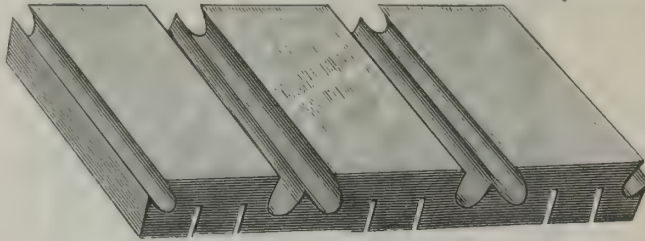
ARTISTIC WOOD MANTELS.

The illustration herewith represents a new and most effective style of artistic wood mantel recently brought out by Mr. Francis D. Kramer, of Nos. 1601 to 1615 Spring Garden Street, Philadelphia. At this establishment are made all kinds of interior hardwood decorations, a great variety of rich designs and fine specimens of carving work being offered for the inspection of customers. Original designs and estimates will be furnished when desired.

A NEW VENTILATING FURNACE.

We give herewith an illustration of a new ventilating hot air furnace manufactured by Messrs. H. Gilbert Hart & Co., of Utica, N. Y., of which many have been sold the past year, all being said to work to perfection. The air to feed combustion is taken from the air space between the casings, the distance between the inside and outside casings being four to five inches. There are return pipes for conveying foul air from the hall and various rooms of the first floor to the furnace, and outside cold air is taken to the furnace by connections with the inside of the casings. In the rear attachment of the furnace there are three positions of the damper, one to conduct the air from between the casings to feed combustion, one to convey the air up through the back shaft to the smoke pipe, and one to cut off all air,

when the furnace ceases to act as a ventilator. A large smoke pipe is used with this furnace, and when the proper arrangement is made for the supply of outside and inside cold air, it is said to work admirably. The front is so arranged that, by turning the thumb buckles on side near top, the top and the entire front can be lifted away, exposing the furnace. By this construction the air supplied to the furnace from between the casings is taken from the lower rooms of the house, and there is no conflicting between the inside and outside cold air

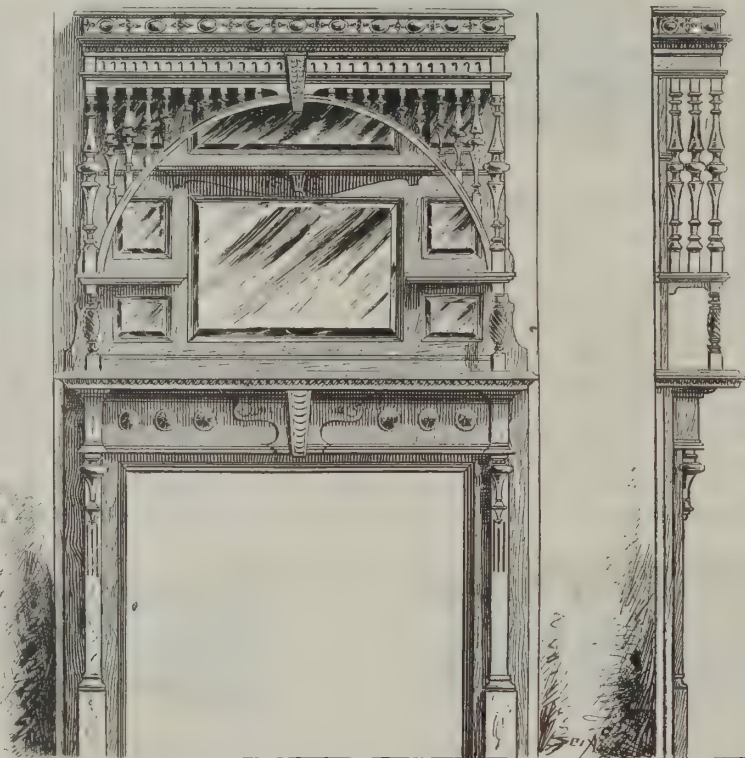


TIMBY'S PATENT SHEATHING AND LATH COMBINED.

supply, affording a thorough draught, as well as most efficient ventilation.

Creosote Wood-preserving Stains.

Samuel Cabot, of Boston, inventor and manufacturer of these stains, has issued a handsome pamphlet



ARTISTIC WOOD MANTEL.

of illustrations of residences in all sections of the country upon which his wood-preserving stains have been employed. These stains are said to be cheaper than the ordinary mixed paints, and to stand the wear of all kinds of climates much better. The pamphlet affords illustrations covering all modern styles of architecture, in showing the various structures to which these stains have been applied, the architects representing many names standing high in their profession.

IN connection with the publication of the BUILDING EDITION of the SCIENTIFIC AMERICAN, Messrs. Munn & Co. furnish plans and specifications for buildings of every kind, including Stores, Dwellings, Carriage Houses, Barns, etc. In this work they are assisted by able and experienced architects. Full plans, details, and specifications for the various buildings illustrated in this paper can be supplied. Those who contemplate building, or who wish to alter, improve, extend, or add to existing buildings, whether wings, porches, bay windows, or attic rooms, are invited to communicate with the undersigned. Our work extends to all parts of the country. Estimates, plans, and drawings promptly prepared. Terms moderate. Munn & Co., 361 Broadway, N. Y.

Large Trees.

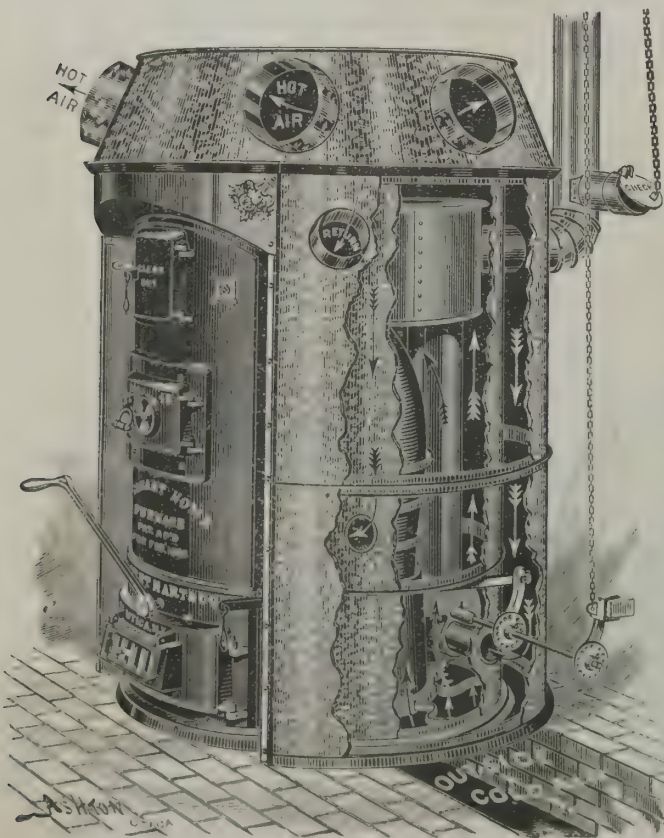
California must be awarded the palm for large trees, but the South can boast of some timber of pretty respectable size as well. Some forest giants lately measured in Green and Wilson counties, North Carolina, compare very favorably with the largest trees of any country, and they are, not isolated specimens, but can be found abundantly in that section. One of them measured twenty two feet in circumference, and would make a stick of timber, solid heart, six feet square and thirty-five feet long, or straight-edge plank six feet wide and thirty five feet long. Another measured eighteen feet in circumference and 100 feet to the first branch. These two were pine, but some white oaks were measured that would make planks two feet wide and sixty feet long. A pine that was felled for making shingles measured four and one half feet in diameter and one hundred and forty-two feet in length.—*Timberman.*

ROTARY CUTTING TOOLS FOR WORKING WOOD.

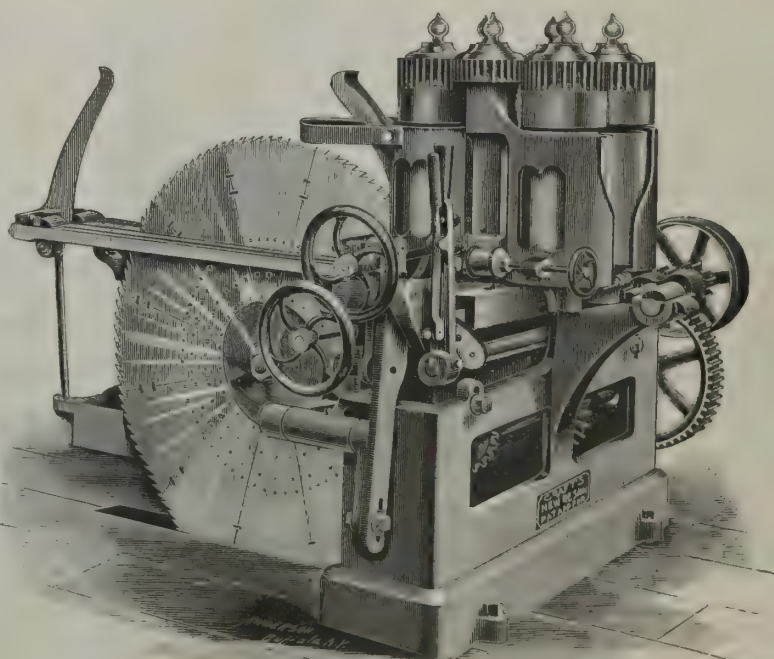
In using thin saws for resawing, the segment saw has proved the most popular, owing to its disinclination to buckle, under the greatest friction. The segment saw will stand up and maintain its rigidity while so hot that you can hardly bear your hand on it, saws as thin as twenty gauge being used, and it is no unusual thing for these saws to resaw from 30,000 to 40,000 feet of 5 4 box lumber in ten hours. But there have been some objections to them (as heretofore constructed) which are obviated in the construction of the machine shown in the accompanying illustration. In using segment saws it is necessary to use a very heavy collar or collars to fasten the segments to. These collars have been the objectionable features, because they split the lumber ahead of the saw, and leave stub shorts on the ends. To overcome this serious objection the operator would place a board of requisite width between the rolls, and fasten it there permanently, and feed the lumber on top of the board. This method afforded a poor support for the lumber, and destroyed the fine centering adjustment so necessary to do accurate work. This most serious objection is overcome by the means employed to throw the collar below the table. This is accomplished by a hand wheel (shown in cut), and provides for a perpendicular adjustment of the saw of sixteen inches. This permits the operator to adjust his saw to the work he is doing, and he should only present sufficient width of blade to reach through the lumber he is resawing. By using the saw in this way it will cut much easier, and is not as liable to dodge as it is cutting with the grain, instead of across it. The saws can be changed in five minutes. This is a great advantage, as when the machine is used constantly as a resaw two saws can be

used, thereby causing no delay to file and set the saw, as the operator can take the dull saw off, replace it with a sharp saw, and fit the dull one up at his leisure. A gain of about 4,000 feet can be made in ten hours by using two saws. The saw arbor is of steel, three inches in diameter, and is fitted with a patented journal box.

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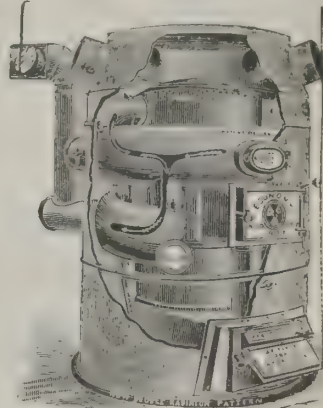
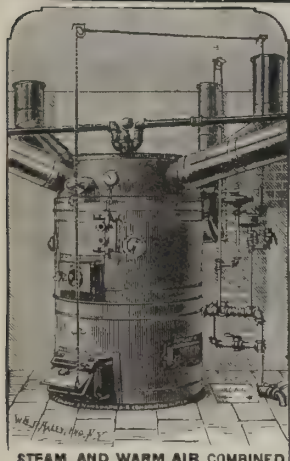
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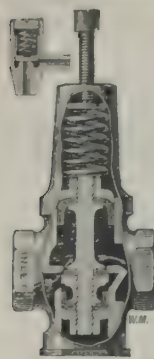
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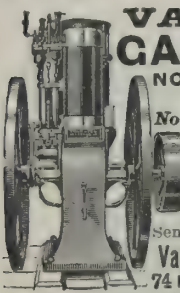


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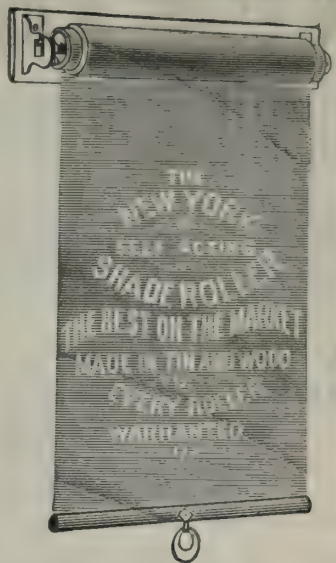


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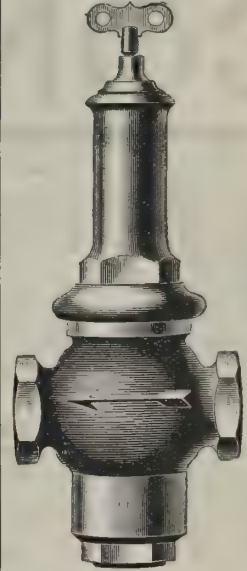
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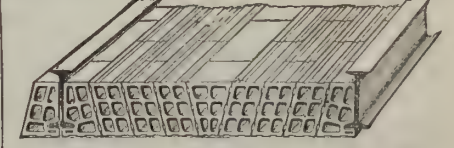
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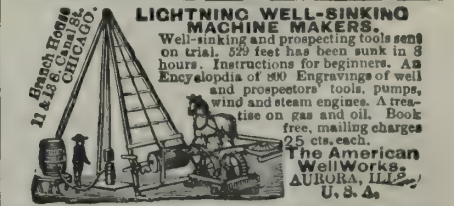
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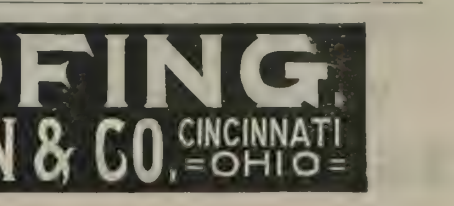
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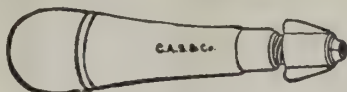
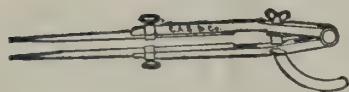
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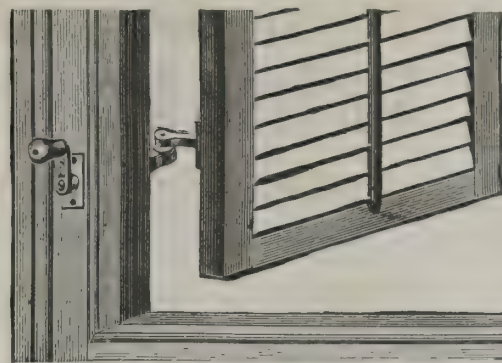
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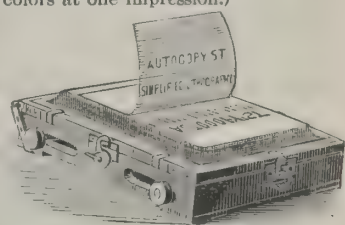
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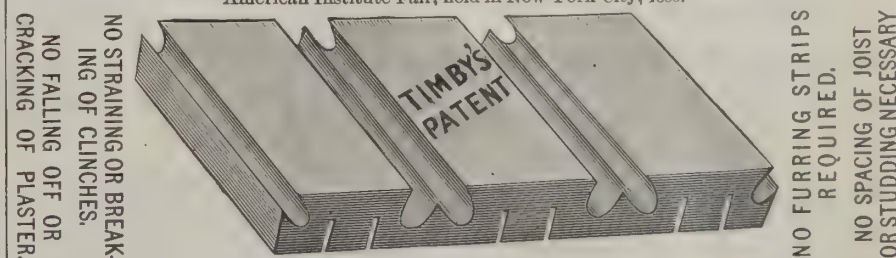
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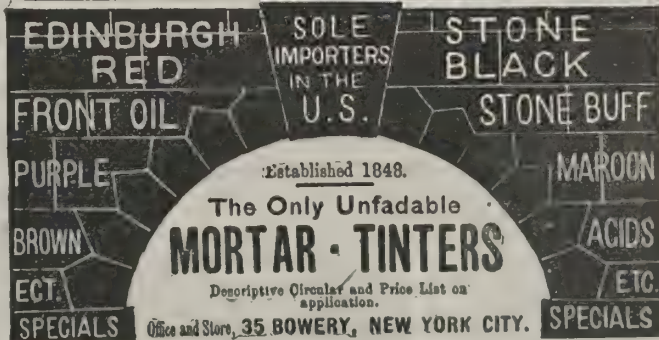
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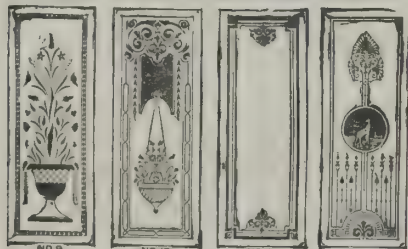
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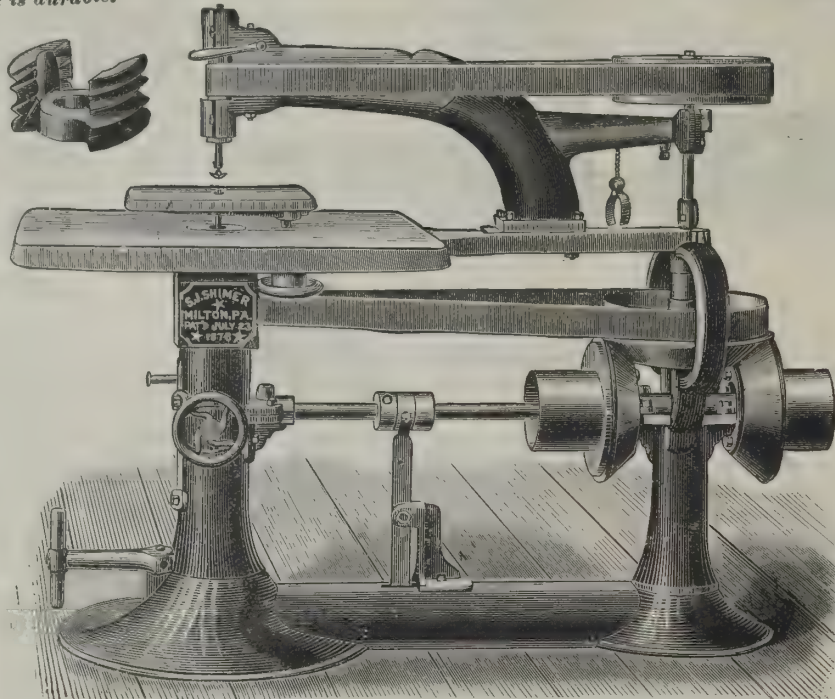
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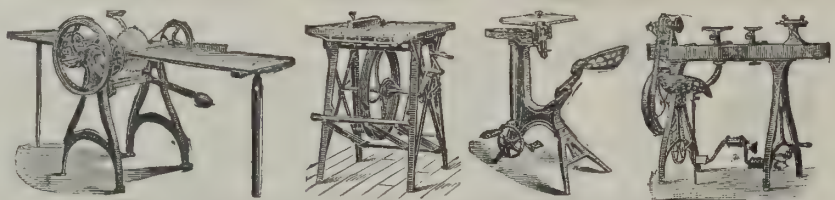
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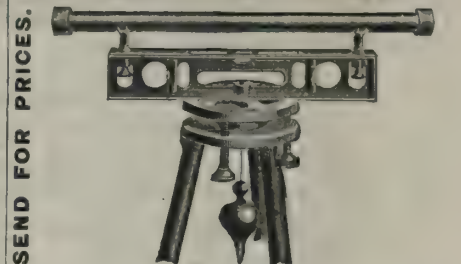
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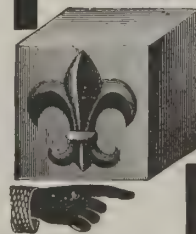
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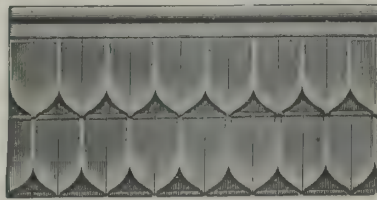
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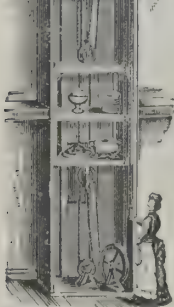
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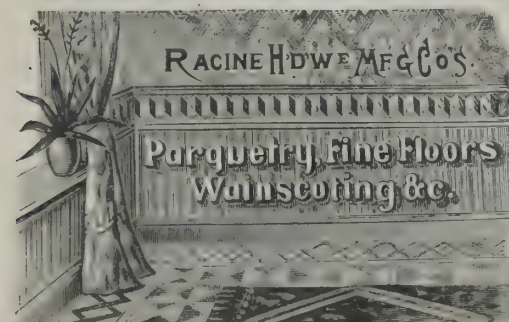
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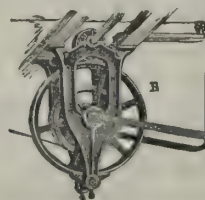
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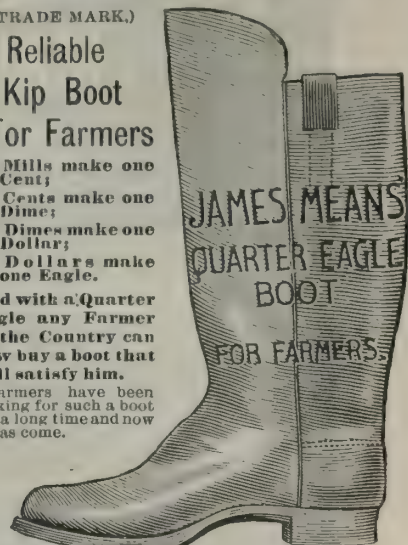
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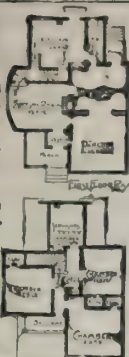


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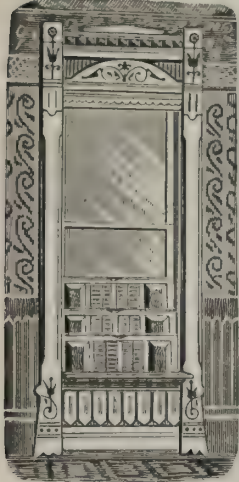
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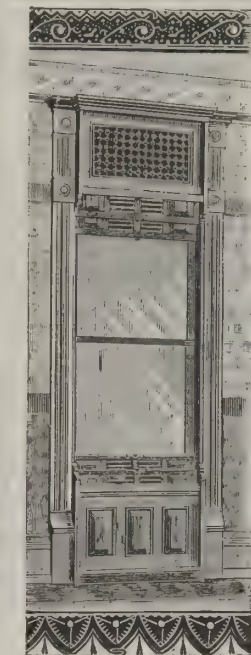
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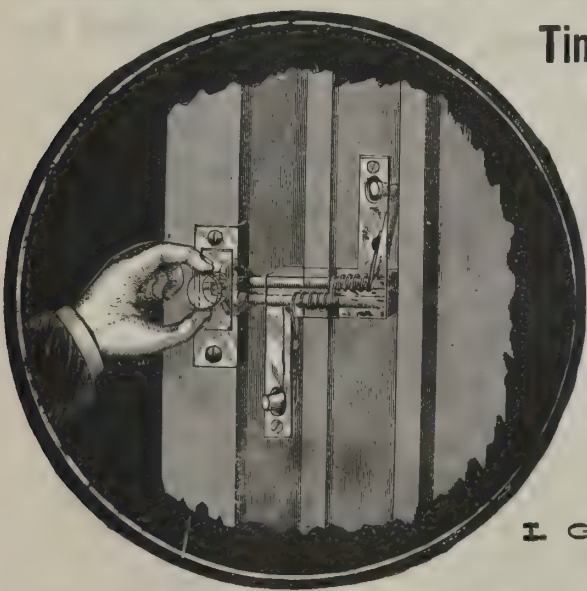
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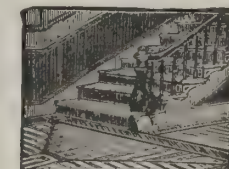
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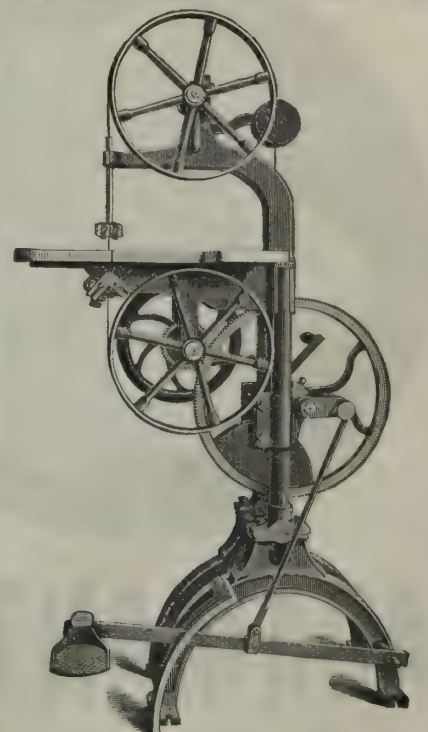


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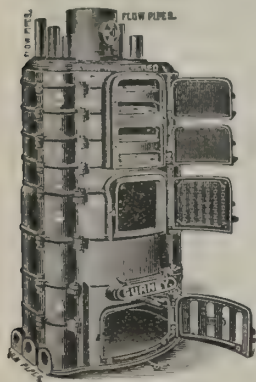
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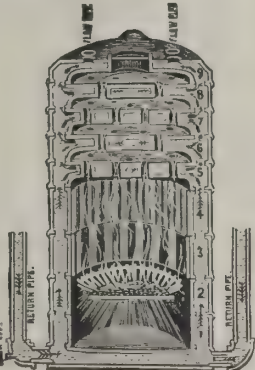
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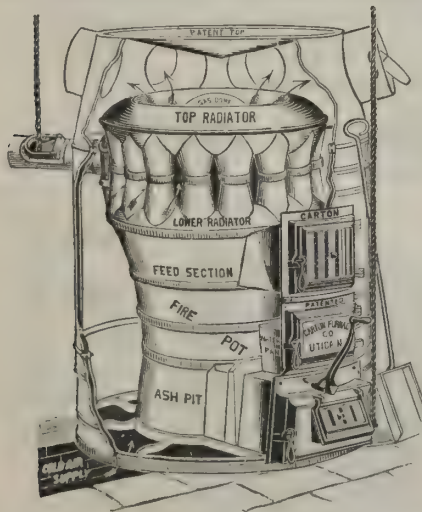
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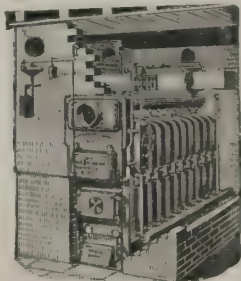
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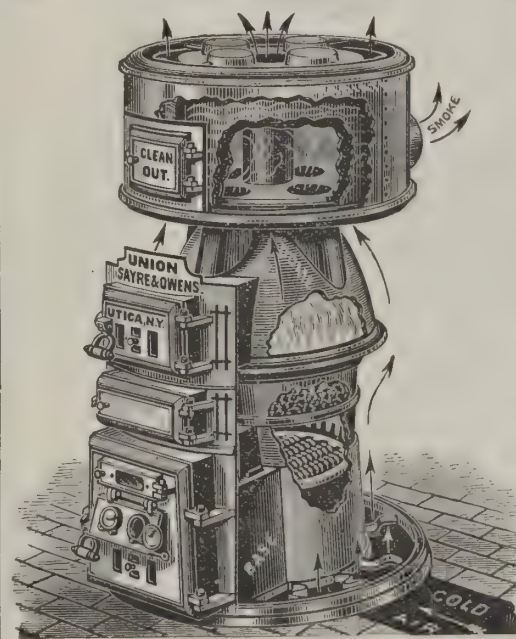
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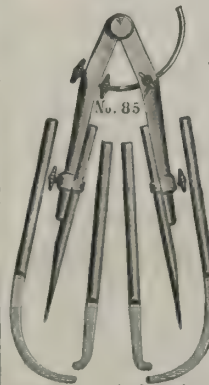
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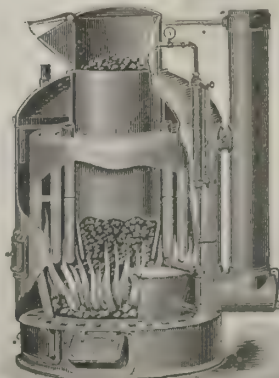
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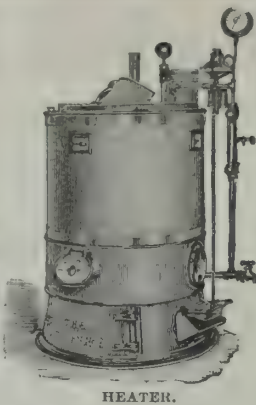
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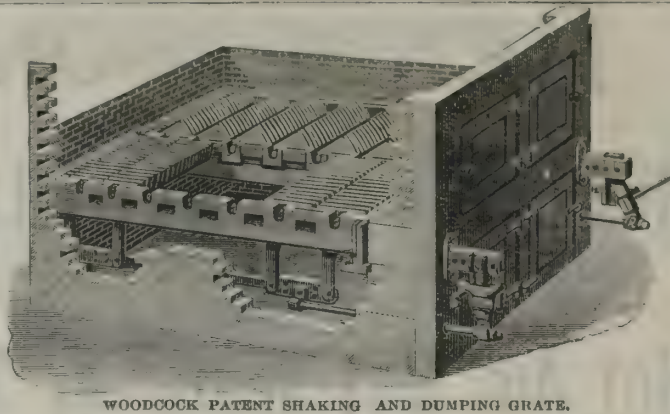
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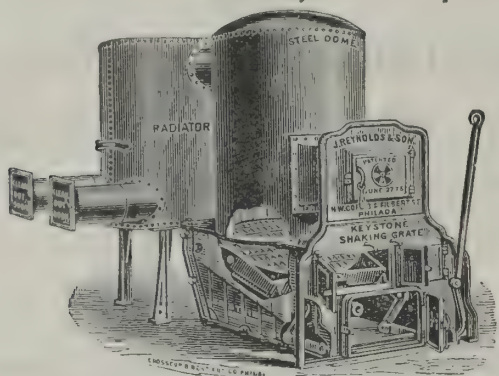


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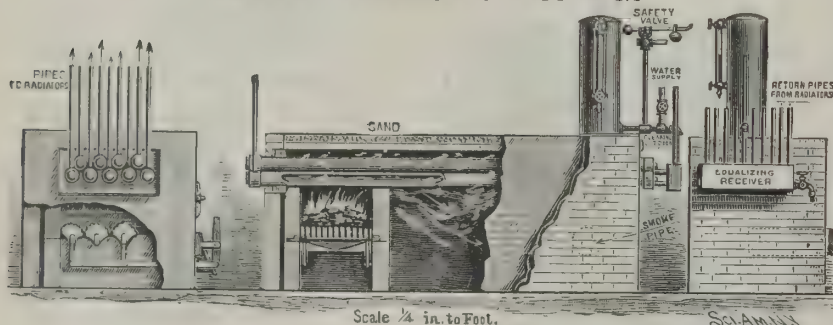
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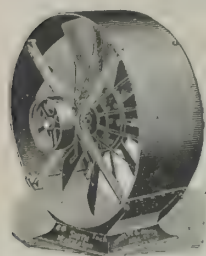
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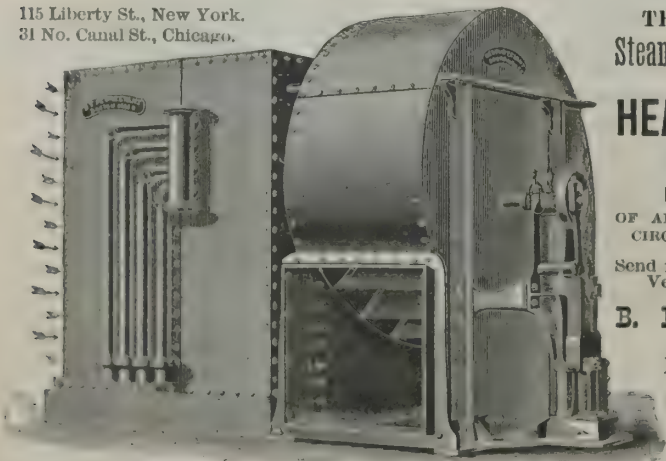
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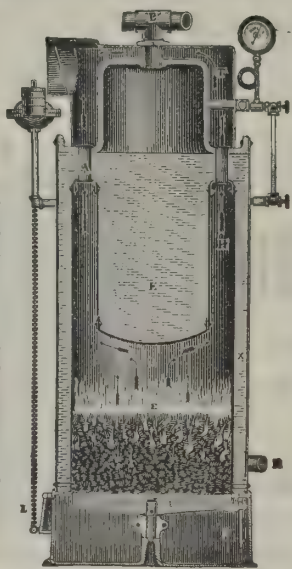
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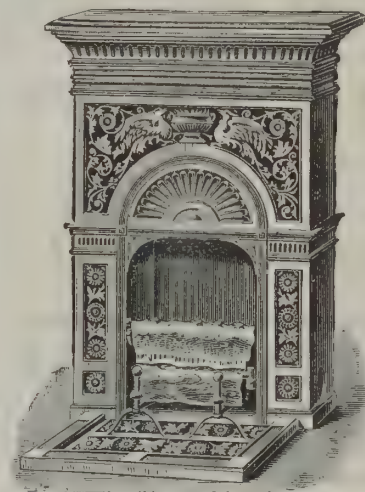
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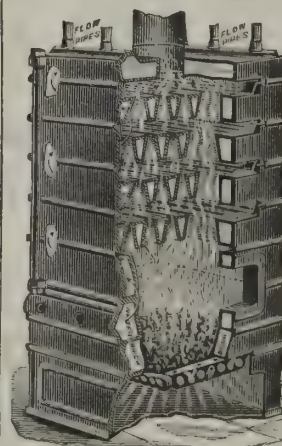
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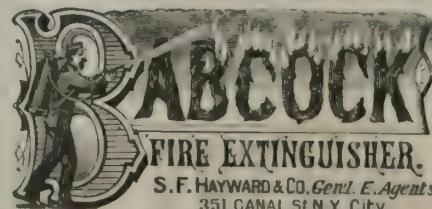
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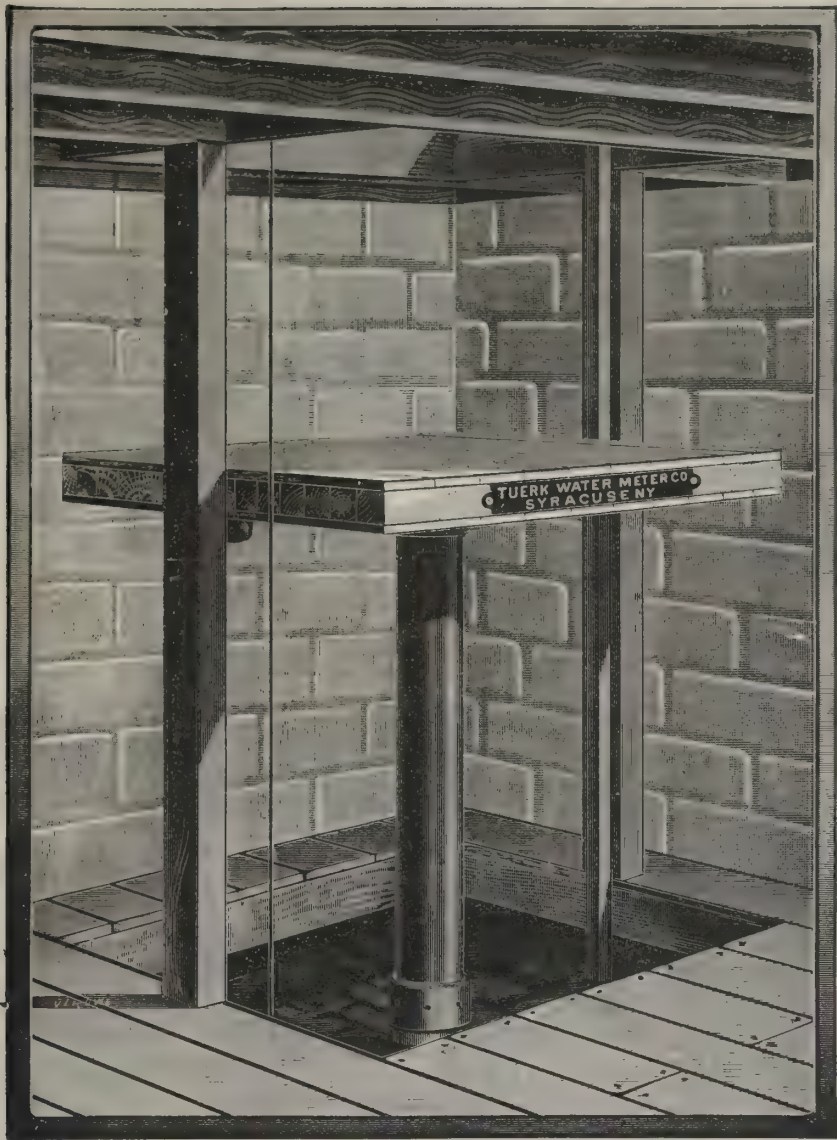
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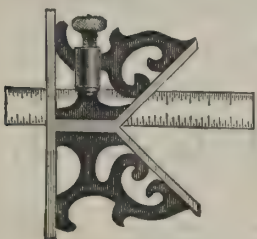


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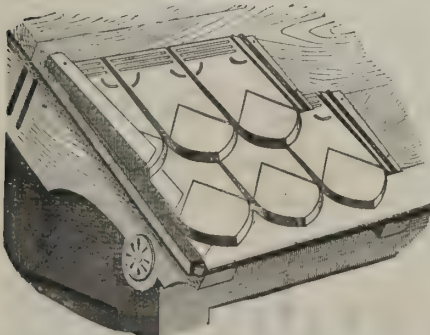


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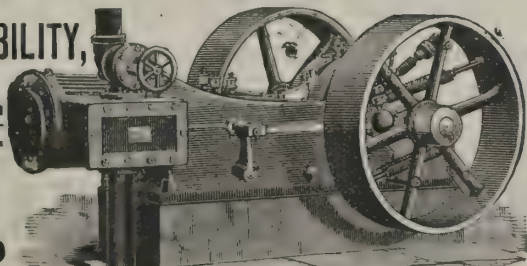
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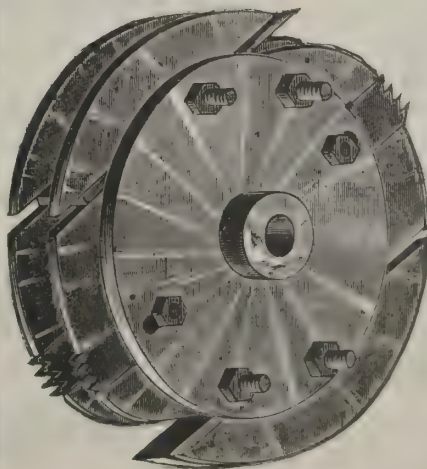
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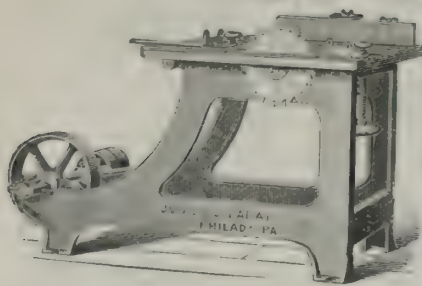
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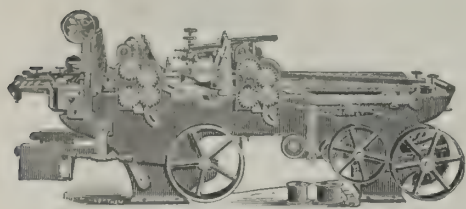
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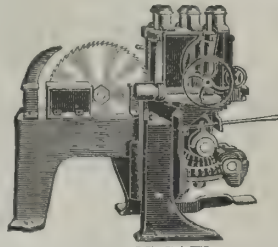
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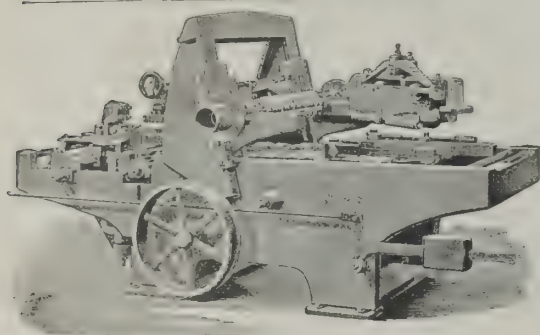


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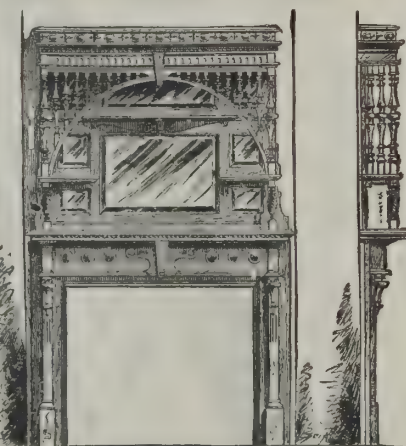
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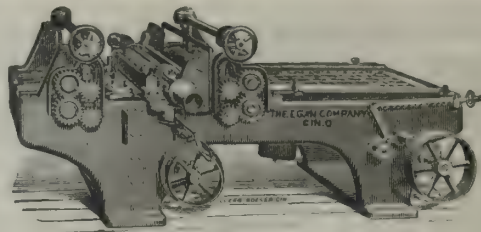


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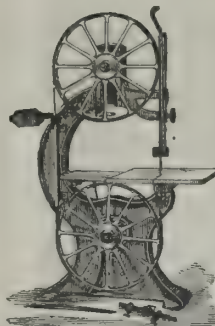
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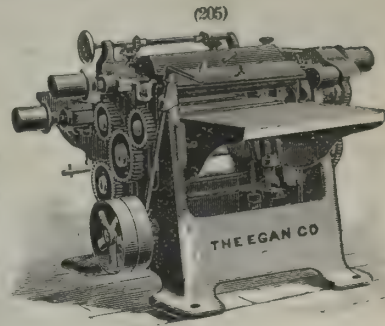
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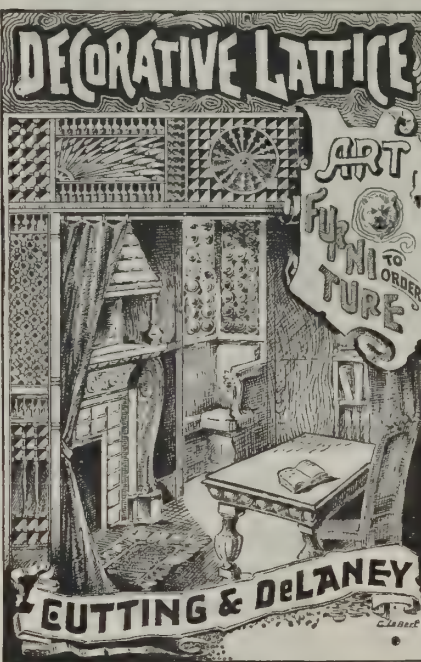
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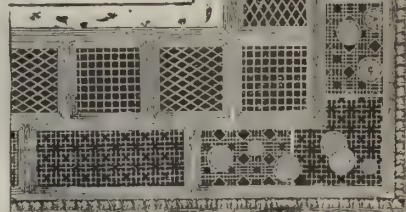
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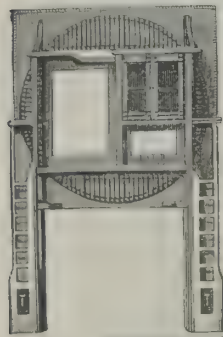
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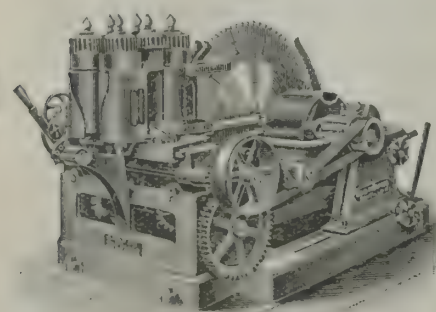
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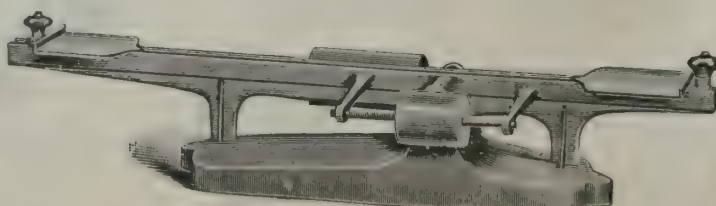
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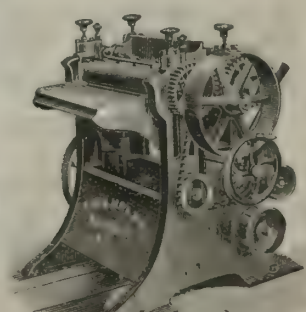
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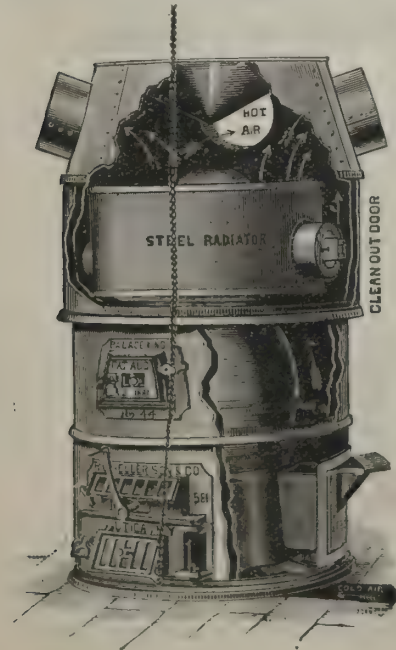
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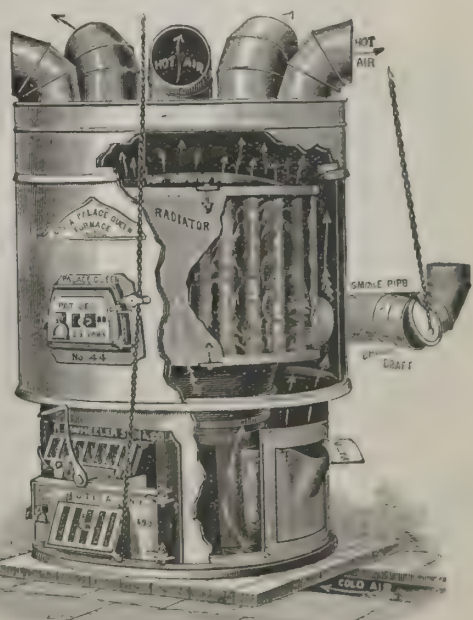
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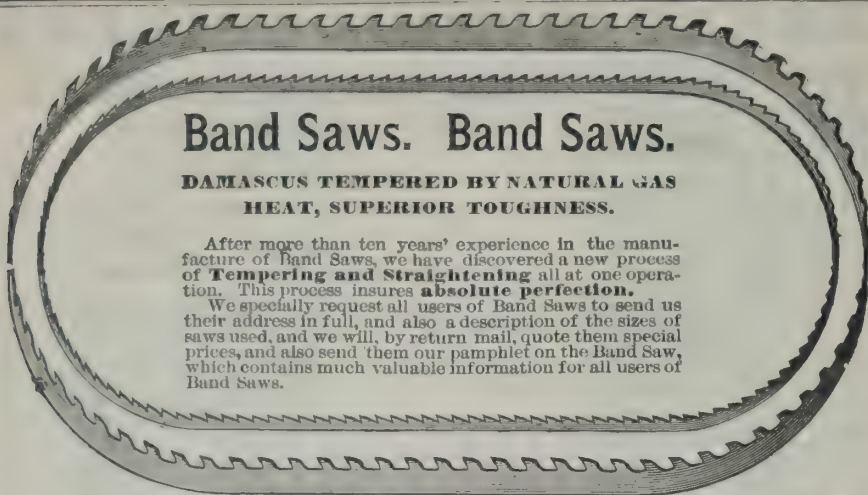
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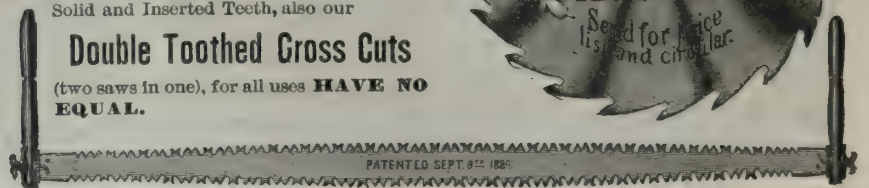
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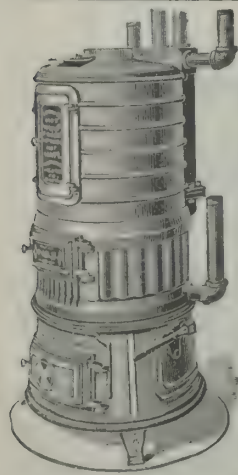


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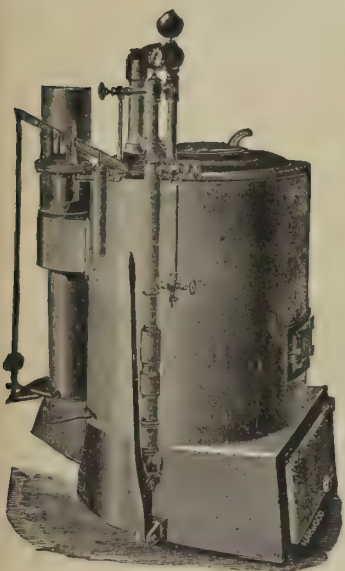
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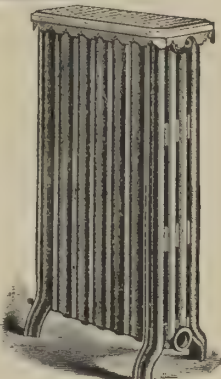
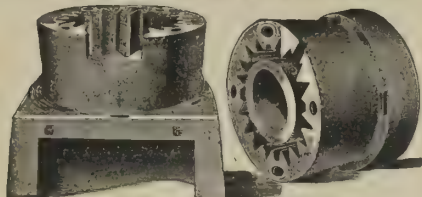
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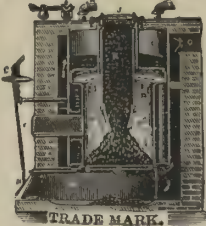
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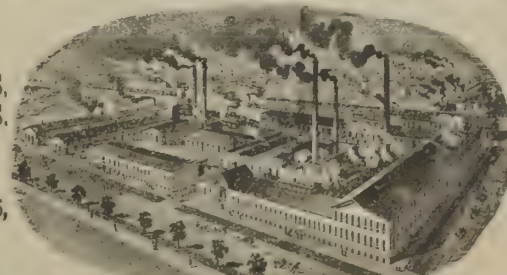
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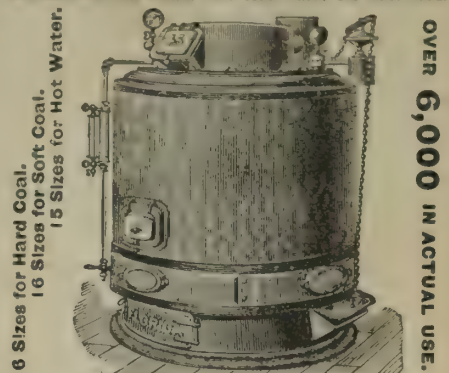
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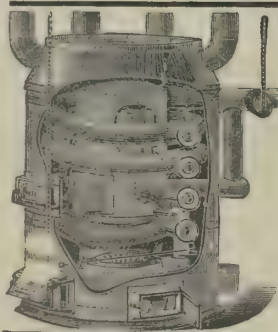
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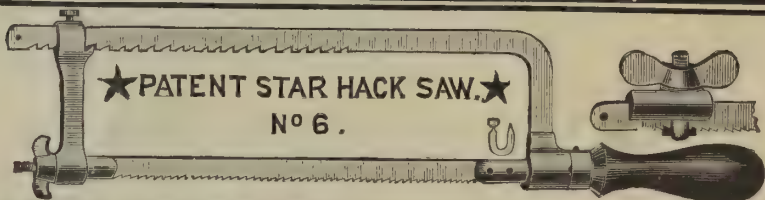


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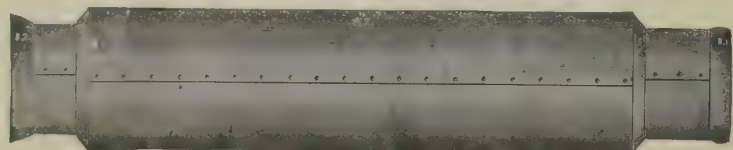
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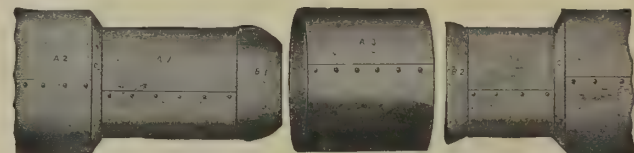
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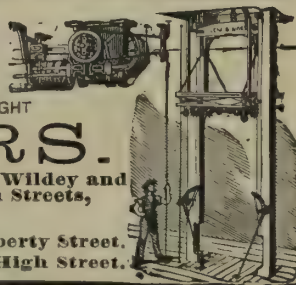
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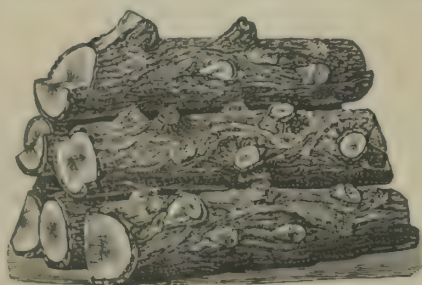
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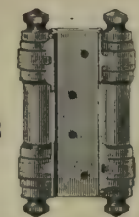
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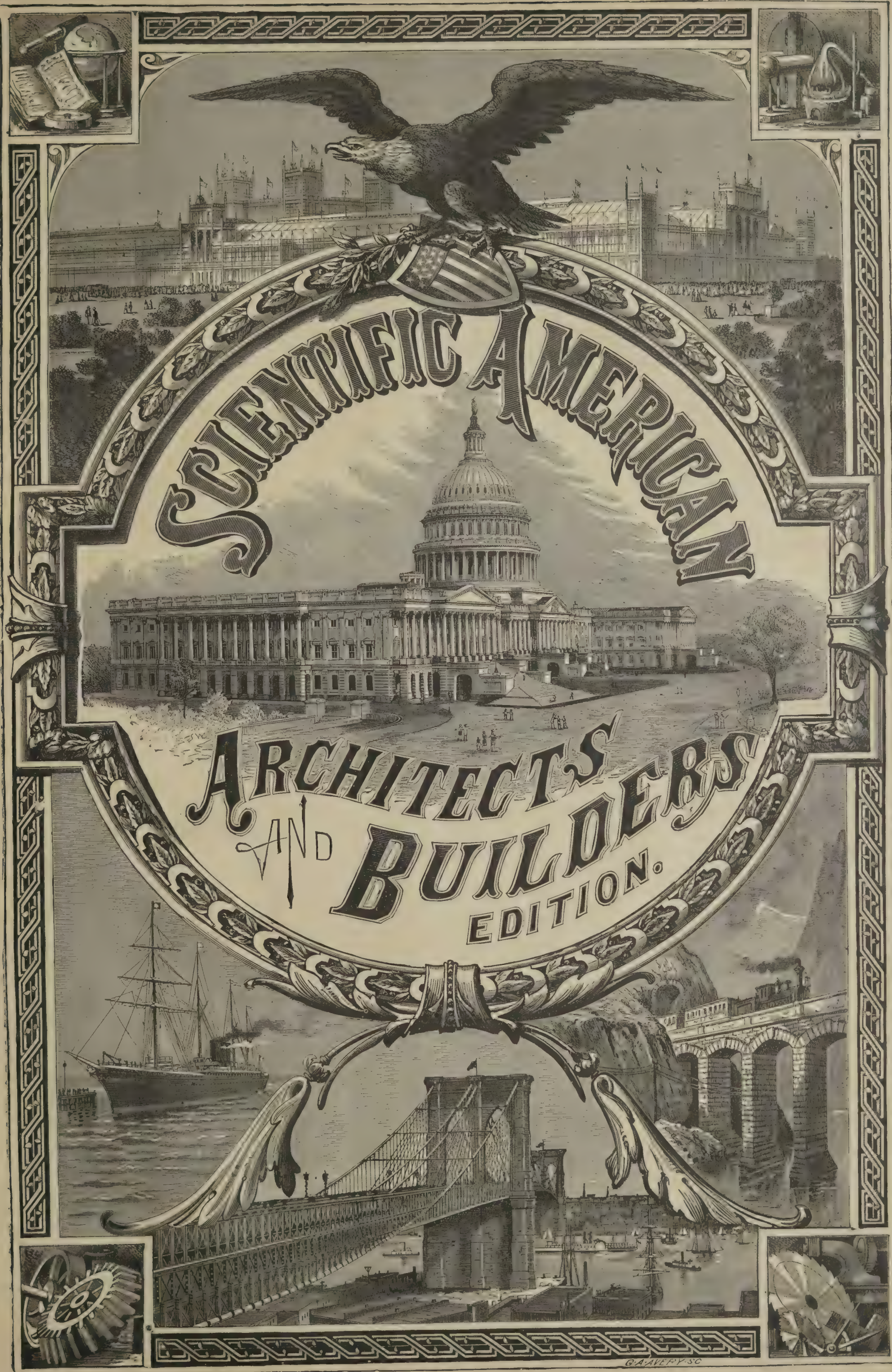


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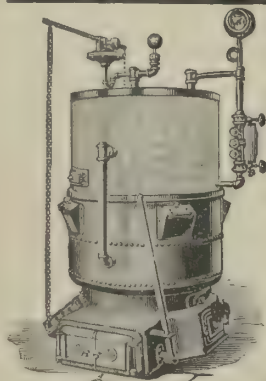
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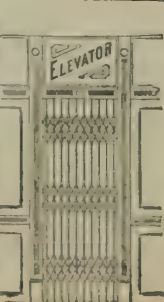
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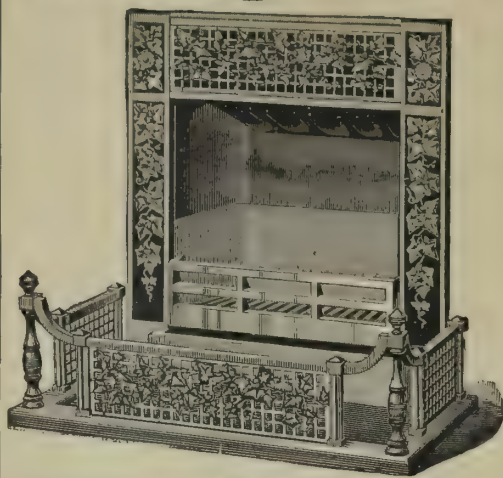
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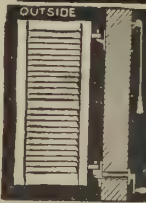
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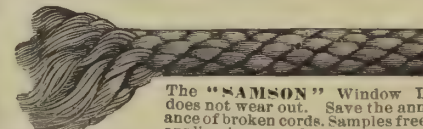
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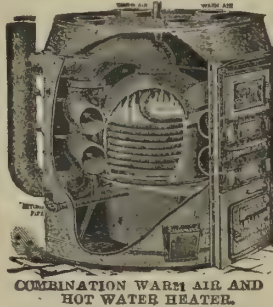
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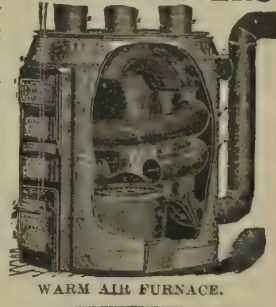
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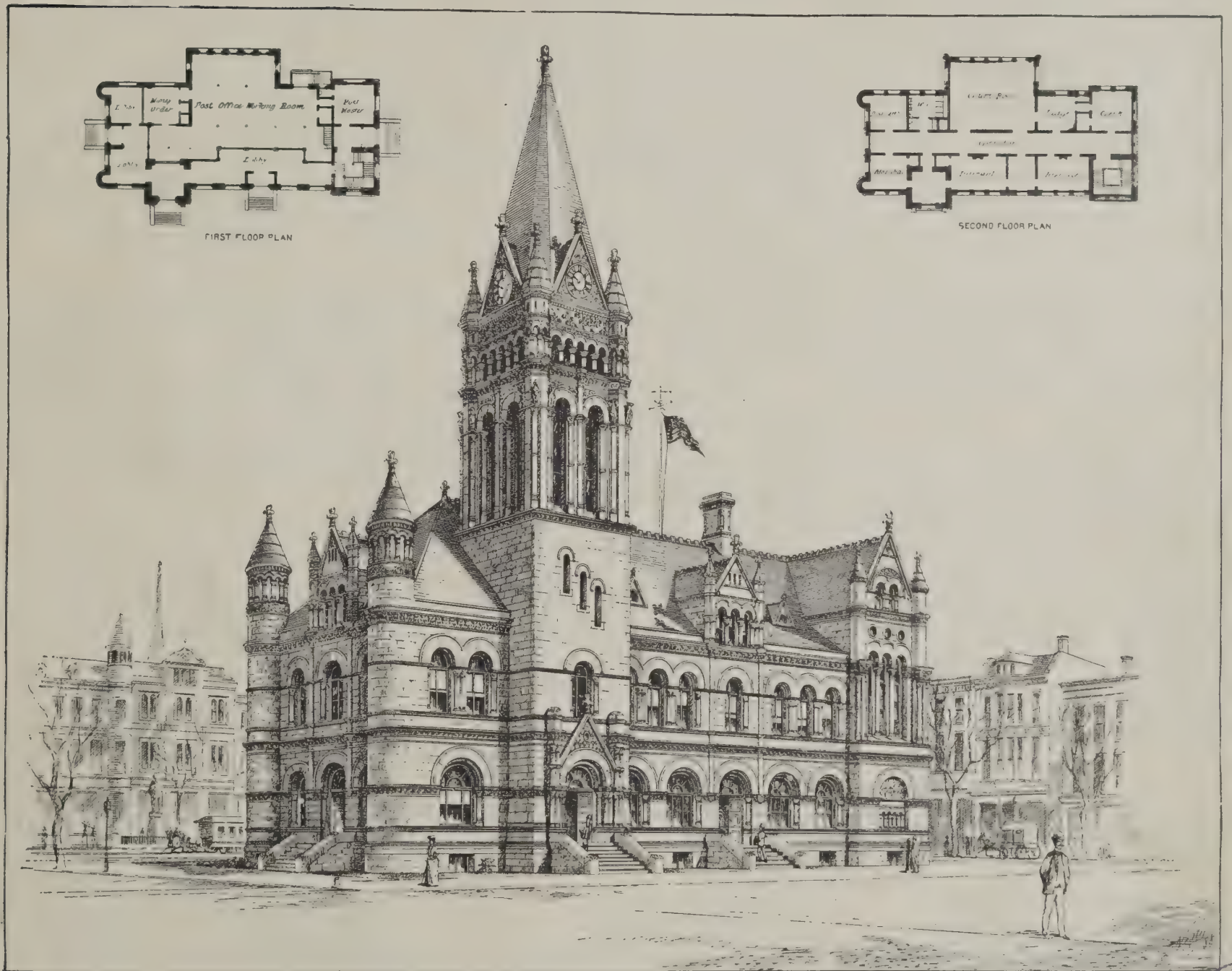
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A FIELDSTONE DWELLING.

Our colored plate shows a house of moderate cost, considering the size, arrangement, and interior finish. The rooms throughout are large, well lighted and ventilated, and arranged so as to be used in connection or separately. The hall is 10' x 18', with a ceiling 10' high, finished in hardwood, and having an open fireplace. With a trifle more outlay another fireplace can be had in the upper hall, which is shortened by the bath room, making it but 3' smaller than the lower hall. The second story is 9' in the clear, with the dining room bay finishing in a small balcony, and the main tower running up one story more, forming a porch or small roof garden, 18' in diameter, with the eaves 6' from the flooring. The principal material, as shown, is the ordinary fieldstone or boulder, which can be secured almost anywhere for the trouble of carting it away. The main porch is 6' wide by 26' long, the entrance being protected from the weather by a gable roof, extending far enough beyond the floor line to give a clear driveway. The conservatory, a room 12' x 21', opens off the dining room. The kitchen, which is all but detached from the main building, needs little or no explanation, as the plans will show. The attic, if desired, can be finished off in three good sized rooms, with enough available space left for storage room. About \$9,500 is the estimated cost. For drawings of details see page 97.

A COTTAGE OF MODERATE COST.

One of our colored plates this month shows a dwelling having among its special features quaintness of exterior and admirable arrangements of interior.

With a floor area of 36' x 24', exclusive of the circular bay, four good sized rooms, a large hall, and a porch 11' x 6', are obtained on first floor, and five rooms, a bath room, and hall on the second floor. Special attention has been paid to kitchen fittings and closet accommodation on both floors.

The heights of stories are: Cellar 7', first floor 9', second floor 8'. The entire vertical sides of the cottage, from water table to cornices, are covered with shingles.

Roof is also shingled. Foundation brick. Cellar under whole house.

The estimated cost is \$3,200. On page 96 we give a variety of details, drawn to scale, which will be appreciated by the builder.

THE NEW FEDERAL BUILDING, WORCESTER, MASS.

The new Federal building to be erected at Worcester, Mass., and for which Congress has appropriated the sum of \$250,000, will be located on a lot bounded by Main, Southbridge, Myrtle, and Burnside Streets, the building fronting on Main Street.

In dimensions it will be 120' by 60', with a tower on Burnside Street, each 8' in diameter. The principal tower will be 140' high and the smaller ones 70'.

The first floor has a P. O. working room about 45' x 70', a money order and registry room. Postmaster's room and ample corridors and lobbies.

The second floor contains a court room 35' x 41' and 23' high. Judge's room, clerk's room, district attorney, marshal's room, two rooms for internal revenue, ample corridors, water closets, etc.

The third story has jury rooms and store rooms for files and documents.

The building, generally, is two stories and attic high, large dormer windows lighting the attic.

It will be practically fire proof to the roof, the floors being of iron, brick, and terra cotta, and the columns and girders of iron encased in fire proofing. The walls will be of brick, faced on the exterior with gray granite up to the first floor and above that with sandstone and red granite.

The roof will be slated.

The general style of the exterior is modified English Romanesque. The upper part of the main tower consists of an open arcade richly ornamented. The angles of the tower have pinnacles and grouped columns. At each of the four angles are three carved griffins five feet high.

The tower is finished with a steep pitched roof having elaborately carved gables, in which are placed clock faces. All metal work on roof to be of copper.

The interior finish will consist of hardwood for the main staircase on Burnside Street and the P. O. screen, and pine for the other woodwork. All vestibules, corridors, etc., will be paved with marble tiles. The vaults will be fire proof, and the building heated by steam or hot water.

The cost of the site was \$75,000.

A COTTAGE OF MODERATE COST.

The illustration on page 93 shows a very pretty cottage built at Bedford Park, New York

Cemented cellar under whole of house, containing a furnace fitted up in the best manner.

The entrance hall has an ornamental staircase and opening into parlor.

The trim throughout is of white pine and is finished in the natural wood.

The parlor has an open fireplace, with a hearth and facings laid in tiles and a pretty hardwood mantel.

There are three bed rooms and an alcove on the second floor. By having a door from hall into alcove, the latter can be fitted up as a bath room, and at a very small expense.

Ample storage room in attic.

Cost \$2,750 to build; could be erected in some localities for considerably less.

Our engraving was made direct from a photograph of the house taken especially for the SCIENTIFIC AMERICAN.

A HOUSE IN THE COLONIAL STYLE.

This handsome colonial house was recently built on "Renolds Terrace," at Orange, N. J., at a cost of about \$15,000, complete.

The front of first story is built of brownstone. The rest of the building is of wood, the exterior being covered with clapboarding, painted yellow, with white trimmings. The roof is shingled, and painted a shade of moss green. There is a cemented cellar under whole of house, containing laundry, furnace, etc. The grand hall contains a staircase with newels carved and balusters handsomely turned. The reception room is finished in the style of the "Renaissance." The hearth and facings are of white tiling, and the mantel is of white and gold with a circular mirror. The inside trim is of oak. The ceilings in hall and drawing room are paneled. The floors are laid in narrow widths of oak. The fireplaces, where shown elsewhere, have hearths elegantly laid in tiles and handsome hardwood oak mantels. Sliding doors and arches, with spindle work, separate the principal rooms. The second floor contains five large bed rooms, linen closet, and bath room. Four bed rooms in attic. Gas and all the modern conveniences are provided. Chas. A. Gifford, of London, Eng., architect. Our engraving, on page 103, was made direct from a photograph of the house taken especially for the SCIENTIFIC AMERICAN.

Brick Piers.

The only way to build a good and substantial pier of brick is to lay each course the full size of the pier, and not to, as is often done in this city, build up the outer four inches of the pier seven or eight courses high and afterward fill in the interior, as it is impossible to get proper bed or bond; brick of the hardest quality only should be used where heavy weights have to be borne. Avoid bats and use as little mortar as is necessary to get solid work. Make the size of piers so that whole brick can be used to obtain proper bond; tamp each brick after it is laid in position with a hammer or brick.

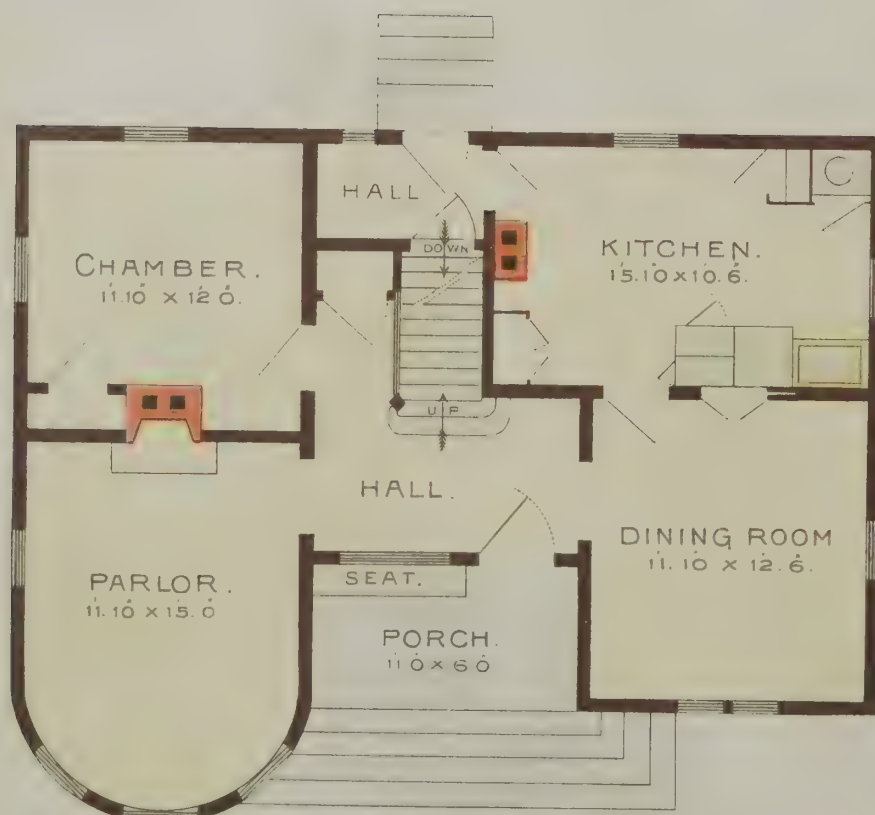
In small piers lay the brick on a bed of mortar and flush up solidly every course; in larger piers make a joint or rub on the bed and lay headers every fourth course. If bond stones are to be inserted, the joints should not be too tight, say from three-fourths to an inch in thickness, the larger the pier the larger the joint, and bedded high in the middle, and in no case on the outer edges of the pier only. Use cement in all mortar in connection with lime, and wet the brick in all cases where there is not any danger from frost; where iron plates or cols set on bond stones, the plate should cover the bond stone as nearly as possible. The present custom of laying brick in dead walls gives one the impression that the quantity of work done is of far more importance than quality. The only way to obtain good solid brick walling is to either flush the joints solid with mortar every course, or make a shove joint; the former method takes too much time, and the latter is rarely done except in very heavy work.

The custom generally adopted is to spread the mortar on the brick (a portion only of which gets in the joints) and lay the brick on top, each succeeding course being bedded in mortar, but the longitudinal and cross joints are only partially filled. Grouting with cement mortar every two courses in height might be adopted for basements and first stories of buildings where unusual strength is required. Full headers for face brick are better than clipping, and should be specified for all heavy buildings. The face brick are often built up fifteen or twenty courses high before the backing up is done, and thus the wall is never well bonded and sufficiently tied together.—Building Budget.

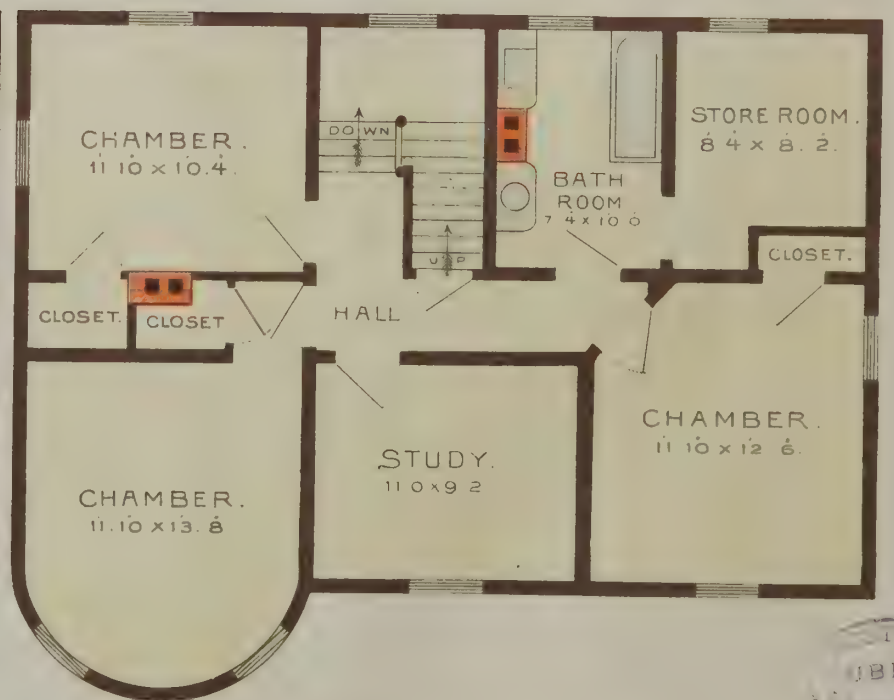
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A COTTAGE OF MODERATE COST.



First Floor Plan

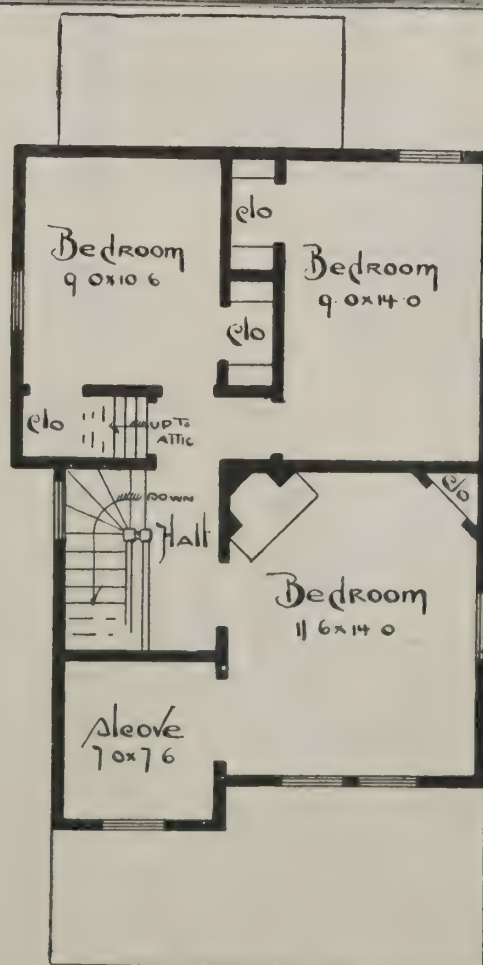
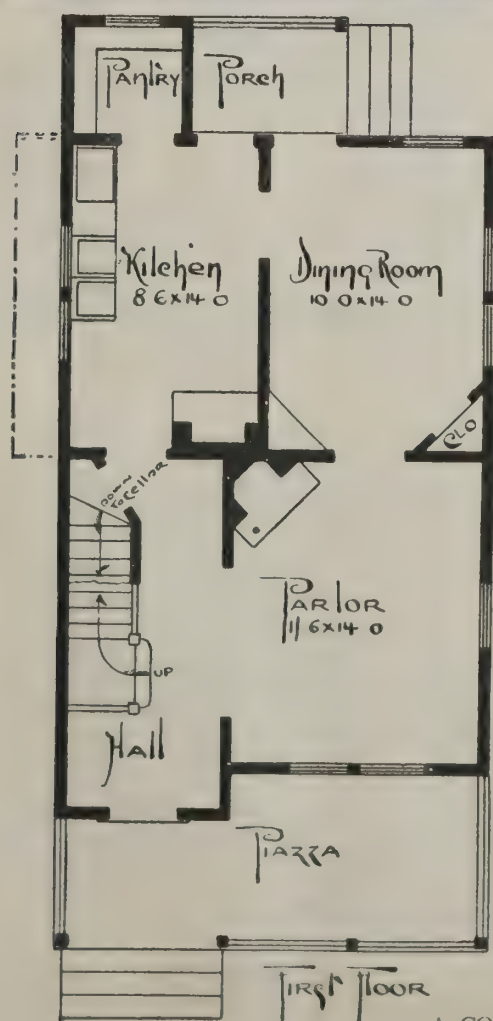


Second Floor Plan



A FIELD STONE RESIDENCE.





First Floor

Second Floor.

A COTTAGE OF MODERATE COST.



A CONVENIENT STABLE.

Our illustration was made direct from the building as erected at Bedford Park, New York.

The first story is covered with clapboarding and the second with shingles.

There is a stable with three stalls, a carriage room, with harness closet and a tool room. In second story there is a billiard room, bed room, and hay loft.

The floor in billiard room is laid in oak.

Home Decorations.

There should be some striking feature in every apartment which, if artistically treated, would give character and tone to the surroundings, even if they be of the commonplace order. For example, the general effect from the entrance doors should be one of simplicity, based upon a certain degree of substantial dignity, impressing the eye with an air of refinement and elegance. While we may employ many articles of bric-a-brac to be found in the furnishing establishments of the day, with not only effect, but good taste, we should remember that a mere collection of quaint and antique articles to the extent of converting an apartment into a veritable curiosity shop, without semblance of appropriateness or order, is to be earnestly avoided.

The general *tout ensemble* of a hall such as we refer to should be derived first from the architectural details which in themselves are fixtures, such as the stairs, mantel, windows, doors, wainscoting, etc.; and secondly from the special articles of furniture introduced, which should be in keeping with the surroundings; and lastly from the accessories which may come under the general heading of bric-a-brac. A scantily furnished apartment is much to be preferred in good taste to one overloaded with articles which seem to be out of place, and which crowd themselves on to the eye

together with hand-painted silk or velvet cushions and small rugs, greatly relieve the solid tones of furniture and at the same time contribute much to the general effect of any apartment.

It is astonishing to find how often well judged but comparatively inexpensive decoration will change an interior of gloomy aspect into one of brightness. The value of the influence of such decoration on the mind of a growing family should not be overlooked.—*N. W. Builder, D. and F.*

A RESIDENCE AT NORTHAMPTON, MASS.

Our engraving, given on page 98, presents an attractive residence that has been erected for Samuel Porter, Esq., at Florence, Northampton, Mass.

The house is built in a substantial manner. The design is most satisfactory.

The foundation is built of stone, and the building above this is of selected bricks, with trimmings of Ohio

A RESIDENCE AT CHATTANOOGA.

This dwelling, located on McCallie Avenue, Chattanooga, Tenn., has just been completed, at a cost of \$10,000, complete, from designs made by Blatherwick & Penn, architects, of the above city. It was built for the owner's use, on one of the main thoroughfares of the city, on a rise of ground which takes in an extensive view of the surrounding country. The building is of Chattanooga pressed brick, foundation walls of heavy masonry. It will be noticed the halls and rooms are large and well lighted, and so arranged as to make a convenient and comfortable dwelling.

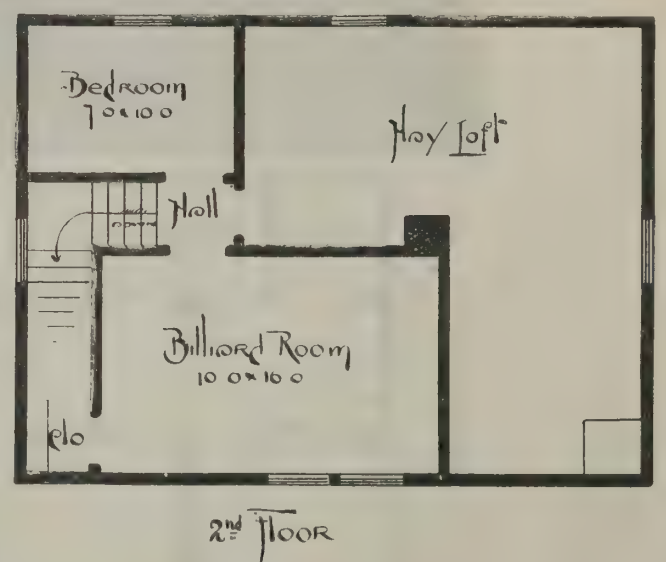
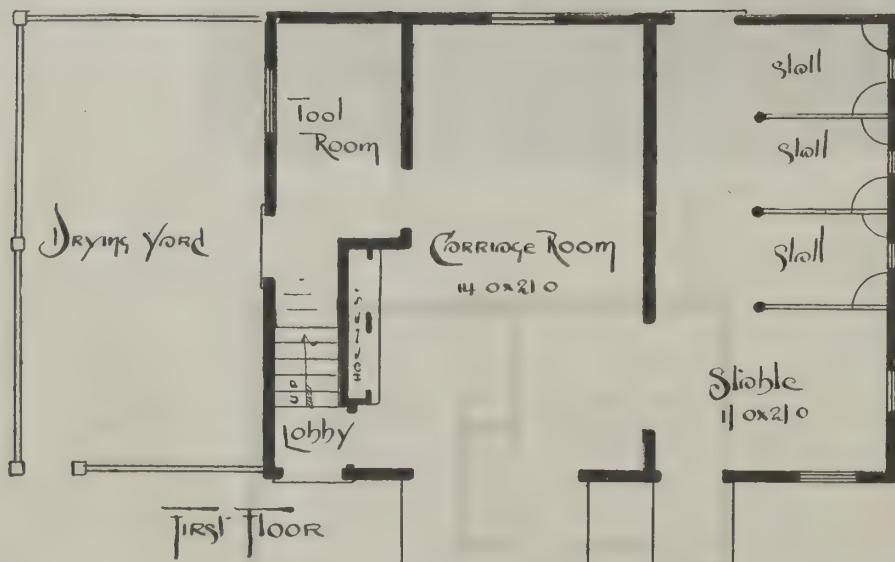
The interior of first floor is of hardwood finish. The dining room, halls, and staircase of oak, the other rooms cherry and ash. The building is heated by hot air, besides a fireplace and elegant hardwood mantel to each room. The plumbing is the best, both in material and workmanship. The house is wired for electric gas lighting, electric bells, etc.

Every room, where necessary, has spacious closets, besides a large linen closet fitted up in wardrobe style, all of cedar. The dressing rooms have washstands and convenient wardrobes.

The basement is large and well lighted, and contains servants' room, laundry, store rooms, and furnace room.

Delights of Color.

Color is intended to be a perpetual source of delight. From the early pleasure in a scarlet dress for dolly and a gilt top, on to the glow and splendor of Venetian art, from the buttercup to the sunrise, all bright color exhilarates and gives a sense of gladness. Till you stay a little in the colorless, forlorn desolation of the houses in the worst courts, till you have lived among the monotonous, dirty tints of the poor districts of London—you little know what the colors of your curtains, carpets, and wall papers are to you. See how the first



A CONVENIENT STABLE.

to the displacement of the more important adjuncts, such as the architectural details and the furniture.

In a moderately sized hall but few articles of movable furniture are necessary beyond a tastefully designed staircase, an appropriate mantel, an oaken chest to fill the vacancy under the stairs, an antique settle near the fireplace; a center table of bronze, with the addition of perhaps two mediæval chairs, may complete the furniture.

The accessories comprising bric-a-brac should consist of a rich antique lamp for the newel post, a pair of vases in Choisey le Roi, cream-tinted pottery with ornaments in raised gold, the neck band in matt gold. For the mantel, small statuettes in bronze or marble, a XIV century clock in bronze, with some hand-painted or curious china, should complete the list.

One of the important features of home decoration in colors should be left to the rugs and drapery, but in their selection care should be used so that a harmonious effect may be had.

Art needle work of various kinds, embroidered scarfs, looped with bright ribbons of odd shades and patterns,

stone and buff terra cotta. The roof is covered with slates. The exterior is ornamented by numerous bay windows, piazza and balcony, etc.

There is a cemented cellar under whole of house, and contains a laundry.

Parlors are finished in cherry, and the back parlor is provided with an open fireplace.

The hall, library, and dining room are finished in ash. The rest of the trim throughout is of white pine.

Four bedrooms on second floor, provided with closets. The bath room is wainscoted.

There are several bedrooms finished off in the attic, with closet, etc.

The house is heated by steam, both the direct and indirect methods being used. The walls and ceilings are frescoed. The doors at front entrance and the windows opening out upon balcony are glazed with stained glass.

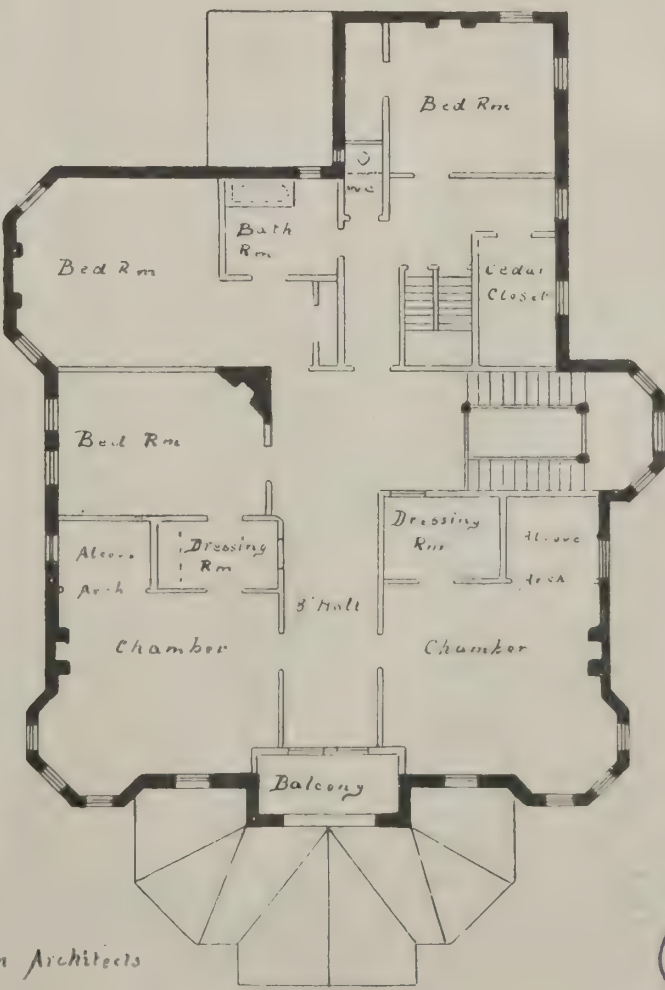
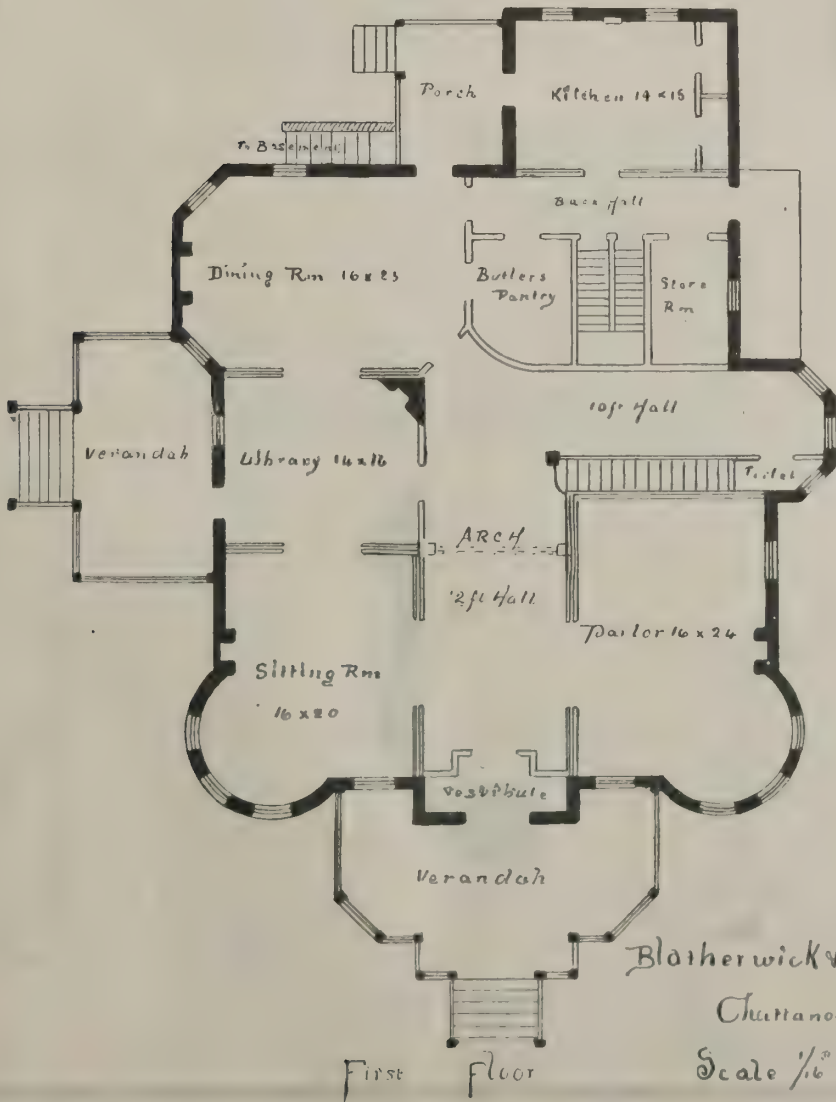
The floors are laid with Southern pine.

This house was erected at a cost of \$10,000, complete.

Our engraving is made direct from a photograph taken especially for the SCIENTIFIC AMERICAN.

thing the Irishwoman does when she gets any affection for her tiny room is to pin up a colored print or put a gay quilt on her bed! Notice the effort of the prosaic English workman to procure pictures in gilt frames, wax flowers, or a red or green table cover! Instantly, if we come upon these little signs of care and taste, however rude, we feel a sense of relief, if we have been wading through the multitudes of monotonous, colorless, dreary rooms, approached by staircases as desolate, which disgrace our courts and alleys. Let the room we enter be small, low, even dark, if but one touch of color strike the eye, it rests there thankful. So instantly, so strangely, does the human soul recognize and rest in one of God's gifts, even when surrounded by the degradation man has too often brought into his Father's bright world of beauty.—*Nineteenth Century.*

PRESERVATION OF WOOD.—M. Kretschmar (*Chemiker Zeitung*).—The timber is first immersed in a bath of a salt of copper or zinc and is then coated with an alkaline solution of resin.



Blatherwick & Penn Architects

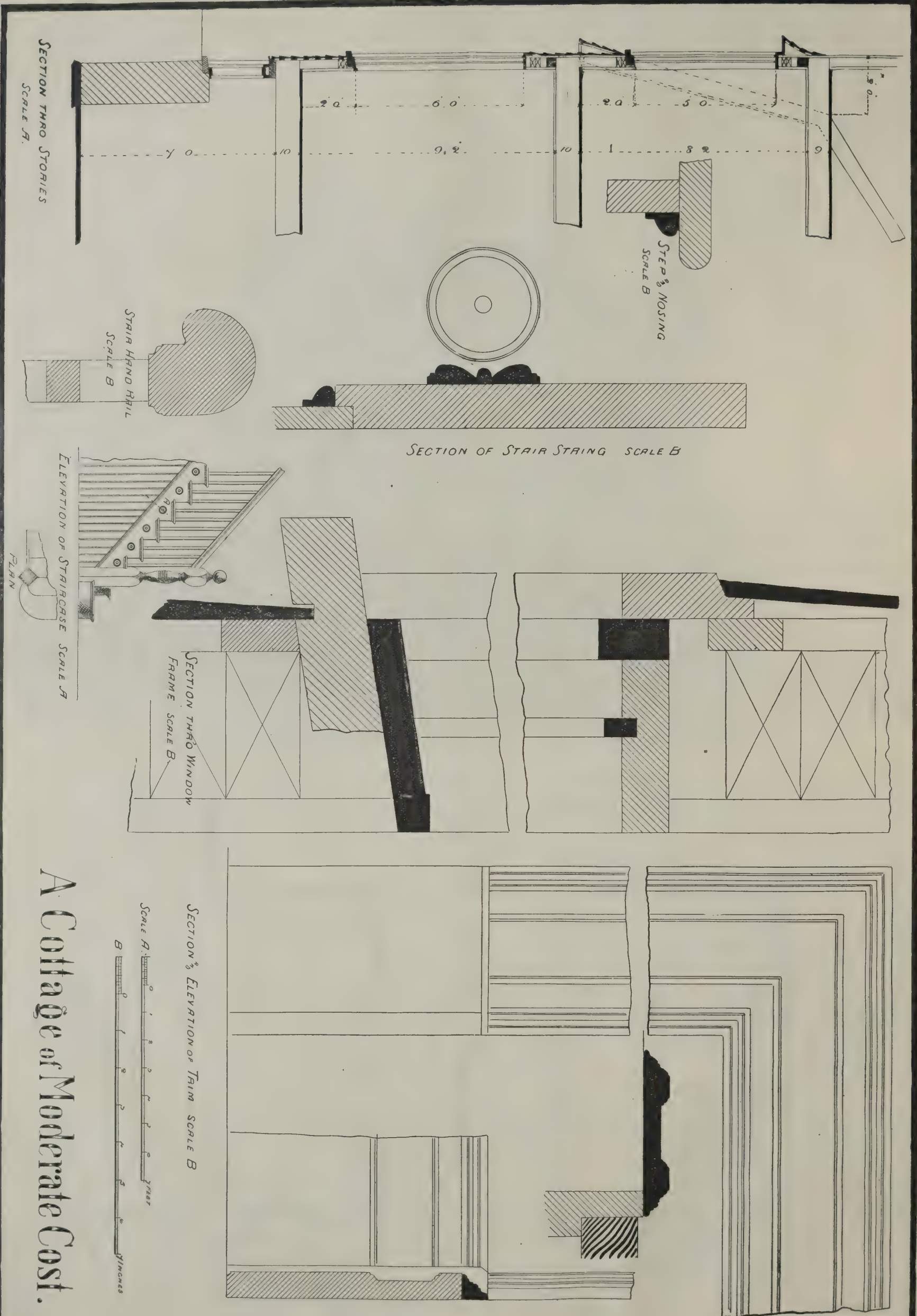
Chattanooga Tenn

Scale 1/16" = one foot

2nd floor

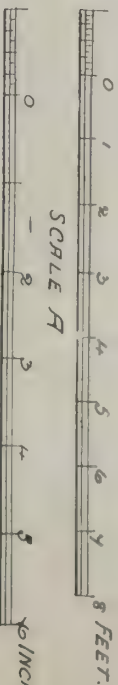
A RESIDENCE AT CHATTANOOGA, TENN.



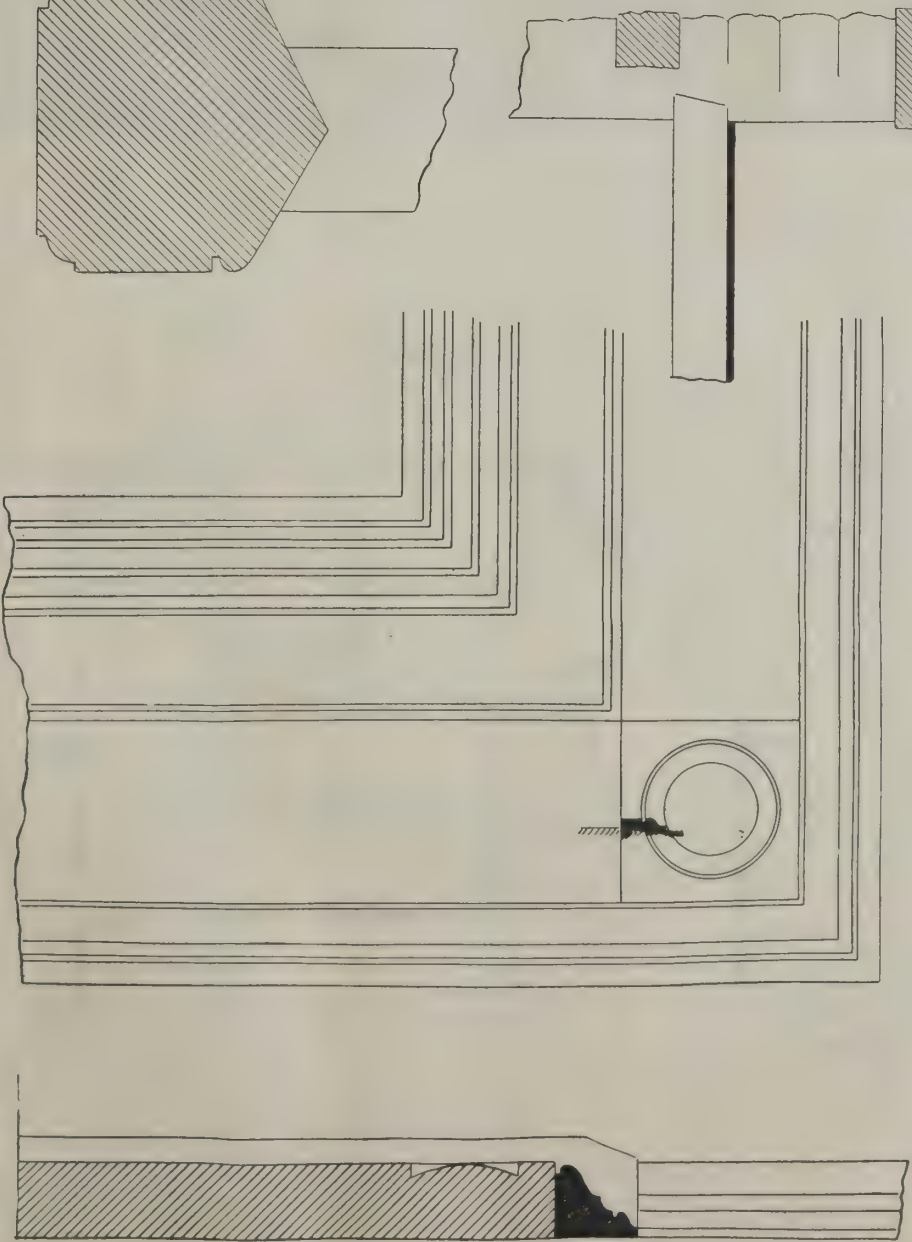


A Cottage of Moderate Cost.

A Field-stone Residence.



SECTION THRO' TOWER
SCALE A



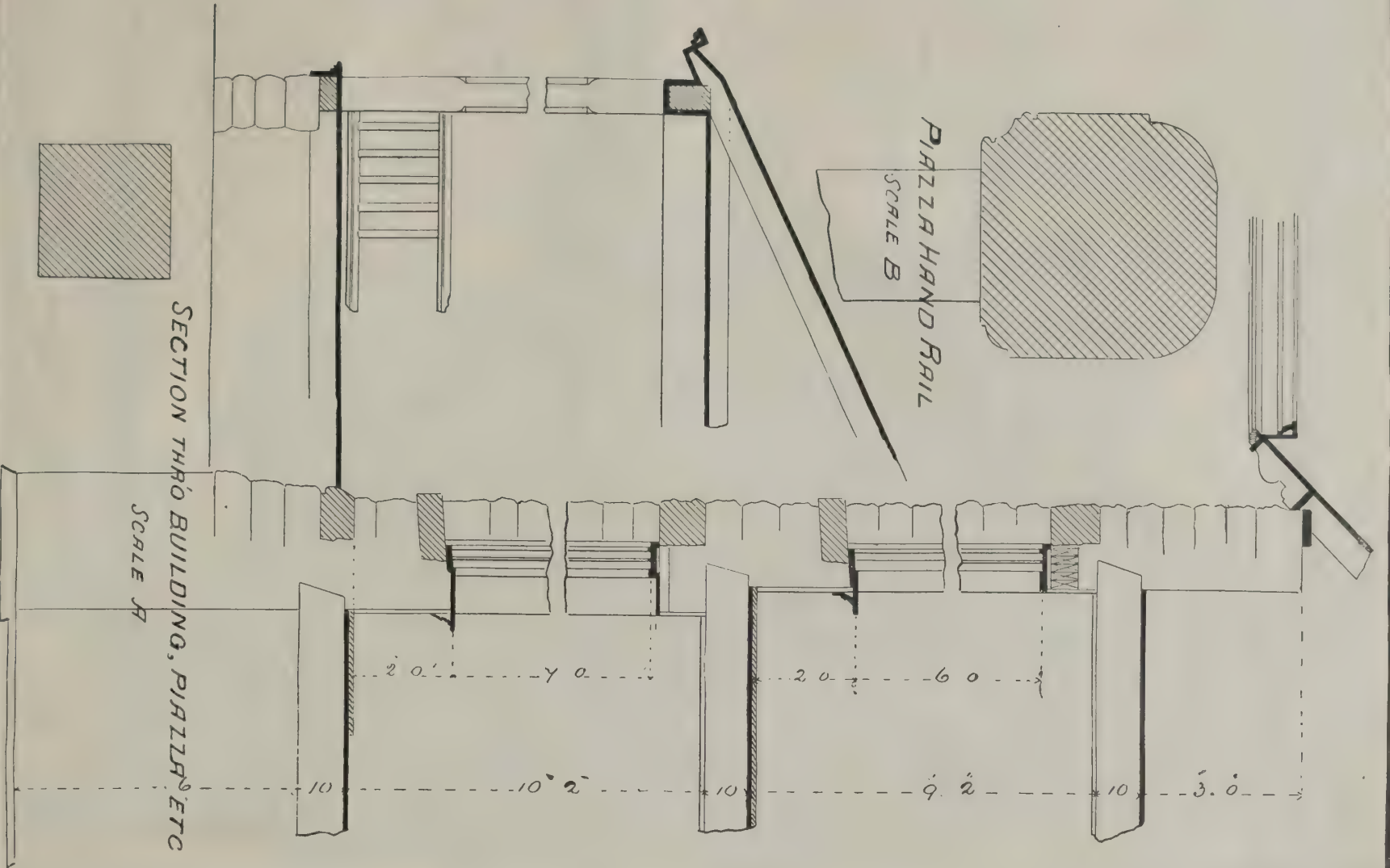
PIAZZA RAIL (BASE)
SCALE B



DETAILS OF TRIM SCALE B.



PIAZZA HAND RAIL
SCALE B



SECTION THRO' BUILDING, PIAZZA, ETC
SCALE A



First Floor Plan



Second Floor Plan

A RESIDENCE AT NORTHAMPTON, MASS.



NEW OLD-FASHIONED HOUSES.

We give herewith an example of the prevailing tendency in some branches of architectural designing, which is to go back to the good old times of the forefathers. Our engraving, which is from the *London Building News*, represents a new dwelling house erected not long ago in Chester, England, a city that is well known for its various quaint structures.

The house is "half timbered," and designed in accordance with the old houses in the city, the period being from 1600 to 1650. On the center breastsummer is inscribed "The Fear of the Lord is a Fountain of Life," following the Latin inscription, "Timor Domini Fons Vitæ," on a shilling of Edward the Sixth found near the site. A short distance from this is the interesting house known as "Bishop Lloyd's," with its carved panels, Adam and Eve, Cain slaying Abel, Abraham's Sacrifice, the Immaculate Conception, the Sorrows of the Virgin, and other devices. The house contains dining and sitting rooms, five bed rooms, bath room, w. c., closets, kitchen, scullery, pantry, cellars, yard, also the builder's yard and workshops in the rear.

Foundations in Alluvial Deposits.

Mr. H. Leonard, the late Chief Engineer to the Bengal Public Works Department, has published in *Indian Engineering* some observations upon a series of experiments carried out by him at Akra with the object of determining the proper proportions of brick foundations in alluvial soil. These experiments were made on a large scale—the piers being of the full working size—and the indications thus obtained are accordingly of strictly practical use. With regard to the amount of pressure that should be permitted upon foundations in alluvial soil, Mr. Leonard found that there was no appreciable sinking with loads up to one ton per square foot, while under a load of two tons there was decided sinking, sufficient to cause bad cracks. If one part of a building on a soil of this description were made to load its foundation with a weight of two tons per square foot, while another part carried one ton only, there would, in all probability, be unequal settlement and bad cracks. Consequently, the load should always be under one ton to the square foot; or if necessarily more, it should be equally distributed over the piers. The next tests were made to discover the best depths for foundations in alluvial deposits, and piers were built at depths of 2 ft. 6 in., or just below the surface spit; at 4 feet, where the true alluvium was found undisturbed; at 8 feet, where a different soil was touched; and at 11 feet, where the soil was soft and water-logged. It was finally determined that, in undisturbed alluvial deposits, from 4 to 6 feet is a good depth for footings—to escape trouble both from heavy rains on the surface and ground water below. Local considerations would, of course, affect this general conclusion. With regard to the spread of footings, it was found that, for a pressure of one ton per square foot, the foundation should be at least 1 ft. 6 in. thick at the toe, and the stepping thereafter at an angle of not more than 45°.

A St. Louis Plumber's Talk with a Reporter.

Thomas Cantwell, a well known St. Louis plumber, gave his experience to a *Globe-Democrat* reporter a few days ago, as follows:

"I was telephoned one day recently to go out to a West End residence immediately, as the house was full of sewer gas and the family would be compelled to move out if the nuisance was not abated. I went out and made an examination, and told them it was not sewer gas. 'Then, what on earth is it that causes this horribly obnoxious odor?' was asked by the occupants. Inquiry elicited the information that the colored coachman had spread a liberal supply of rat poison in the cellar, and that both poison and rats had disap-

peared. That told the story. I cut up a yard square of the first floor, near the dining room, and found one of the rodents lying there beside a biscuit on which 'Rough on Rats' had been placed. The next day the poisonous and suffocating odor came through the hot air registers in the rooms, and the family physician sent the children away and pronounced the house unfit to live in. I examined the cellar closely, but found no rat holes, as the place was cemented. I tore up the cold air box, and in the tunnel, right under the furnace, found a nest of five dead rats. They had come from the stable and passed in through the cellar door. The stench passed into the furnace and permeated every part of the house. The lady of the house was almost

ready to go into hysterics, as a number of guests were to come in the evening for a euchre party. But the house was thoroughly aired and disinfected, and the cards were dealt that night in an atmosphere as pure as St. Louis can afford. But I often find that sewer gas gets into the hot air furnace through defective sewerage. There is a suction to and through furnaces when in use, and people should be very careful to have nothing in the cellars, such as old cabbage and other vegetables, to poison the air. Strong iron guards should be placed over the cellar windows, and on bright days fresh air can then get in, but tramps, cats, dogs, and rats will be barred entrance. A wealthy citizen of Chicago lost three children from diphtheria, which was contracted by sewer gas fumes being carried through the house by the furnace pipes. I know of another case, in another city, where a fine mansion was visited constantly by sickness, which proved fatal in several cases, and, as the sanitary appliances were of the most modern improvement, no reason for the unhealthfulness of the place was discovered for some time. The trouble was finally traced to the beautiful lawn, which was the pride of the owner. The landscape gardener had spread a liberal coat of imported guano as a fertilizer over the lawn. The cold air to the furnace blew over this lawn and carried all the germs and microbes on their mission of death through the mansion."

Portland Cement and Sea Water.

The permeability of Portland cement mortar and its decomposition under the action of sea water has been maintained, if not established, by several scientific experts. Some time ago, MM. Durand-Clay and Paul Debray published results of experiments made by them which went to show that masonry constructed with Portland cement mortar in quay and dock walls was seriously injured by disintegration caused by the production of sulphate of lime in the masonry. Samples of concrete and mortar taken from sea walls were found by experiment to be not only porous, but permeable, that is, water could be passed through it. These conclusions are borne out by the condition of many sea walls and bridge piers, which show signs of decay. The engineer engaged in hydraulic works will do well to make sure of the composition of the cement mortar employed on this class of construction. Those samples containing the

largest quantities of magnesia or sulphuric acid were found to be most injured by the sea water. Further experiments would be useful to discover what proportions of ingredients are necessary, how the sea water can be prevented from entering the body of the masonry, and the means of checking the production of sulphate of lime. The object would appear to be attained by preventing the sea water penetrating the walls, either by incasing it with some impermeable material or sheathing.

SOME very valuable experiments have lately been made in Germany on the preservation of wood by means of sulphate of copper and tar.



A HALF-TIMBERED HOUSE AT CHESTER.

peared. That told the story. I cut up a yard square of the first floor, near the dining room, and found one of the rodents lying there beside a biscuit on which 'Rough on Rats' had been placed. The next day the poisonous and suffocating odor came through the hot air registers in the rooms, and the family physician sent the children away and pronounced the house unfit to live in. I examined the cellar closely, but found no rat holes, as the place was cemented. I tore up the cold air box, and in the tunnel, right under the furnace, found a nest of five dead rats. They had come from the stable and passed in through the cellar door. The stench passed into the furnace and permeated every part of the house. The lady of the house was almost

The Effect of Moisture on Wood.

Dr. Hildebrand has carried on investigations into the action of moisture upon various kinds of wood, the results of which he publishes in Wiedeman's *Annalen der Physik und Chemie*. We learn from the article on the subject, which is a lengthy one, that the author confined himself in his experiments to observing the extension of the longitudinal fibers of wood, leaving out of consideration the well known phenomena of the swelling and the shrinkage of wood, which take place in a direction perpendicular to the longitudinal fiber. The author finds that, within certain limits, the length of wood in the direction of its fiber depends upon the amount of water present in its membranous tubes. Supposing a wood absorbs from twenty to thirty per cent. of water (which is the range of the increase of weight dried under an air pump), the increase of length varies between one-tenth and two per cent. The greatest length is attained when wood is kept in air saturated with steam, or when placed in water. The weight and length of wood increase with the relative moisture of the air, and diminish with the decrease of moisture. The kinds of wood named below, which were exposed to the natural variations of moisture in the air during summer, showed the following changes:

	Relative Moisture of the Air.	Variation in Length. Per cent.
Mahogany	{ 0.814 0.570 }	0.057
Ebony	{ 0.814 0.665 }	0.03
Fir	{ 0.798 0.765 }	0.012
White Beech	{ 0.814 0.570 }	0.05
Red Beech	{ 0.814 0.570 }	0.043
Alder	{ 0.814 0.665 }	0.047
Oak	{ 0.798 0.584 }	0.062
Lime-tree wood	{ 0.798 0.584 }	0.028
Maple	{ 0.814 0.665 }	0.019
Pine	{ 0.798 0.570 }	0.043
Poplar	{ 0.814 0.570 }	0.069

The author says that great care should be exercised in selecting wood for measuring rules. Mahogany and oak are entirely unsuited for rules, and the best woods to be used for the purpose are maple, fir, red beech, and lime tree. He also states that the usual treatment of wood with polish, oil, or lacquer does not protect wood from the action of air saturated with steam. The best protection is afforded by lacquering, but the lac employed should be most carefully selected if the wood is intended for rules to be used for exact measurement. The author further adds that even ivory is not free from the action of moisture.—*The Builder*.

A RHODE ISLAND BARN.

We give herewith a view and plans of a fine barn lately erected near Providence by Mr. William H. Hopkins, who invites readers interested to visit the build-



Fig. 1.—THE HOPKINS BARN, NEAR PROVIDENCE, R. I.

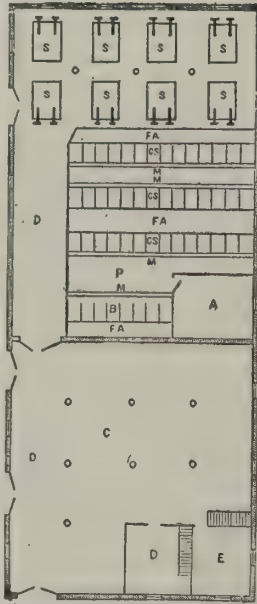


Fig. 2.—GROUND FLOOR.

Fig. 2.—A, paddock; B, calf stalls; C, storage for tools; C S, cow stalls; D D, driveway, 15 ft. wide; E, office, 15 ft. square; F A, feed alley; M, manure trough; O, grain, 15 ft. square; P, passage; S, silo trap.
Fig. 3.—A, alley; E, engine; F, feed troughs; G G, grindstones; H, hay; A, harness room, 15 ft. square; H S, horse stalls; M, manure space, 15x60; O, oxen; O S, open space; P, paddock; R, roots, 15 ft. square; S, silo.

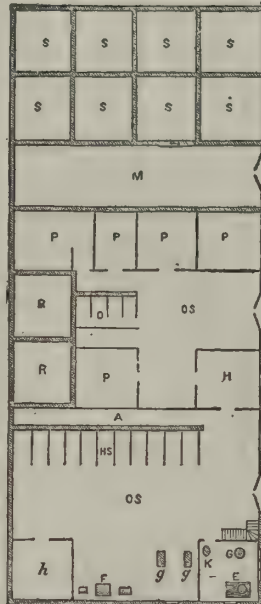


Fig. 3.—BASEMENT.

ing. The structure is 60x145, and is so arranged that the owner can drive in and see every animal from his carriage. The basement is stone, pointed on both sides;

bottom cemented. It has four cross walls running through it; 25 posts. The main floor timbers (running the length of the building, supported every fifteen feet either by cross walls or substantial posts on stone foundations) are 9x10, hard pine. The second floor should be the same, joists for both floors 3x9, all fifteen feet long. The basement is all above ground on the west, and is ten feet in the clear, as is also the first floor, except the driveway, which is fifteen feet for high loads of hay. It has a work room heated by hot water, furnished by a large stove, with a coil of one inch gas pipe connected with a thirty inch kettle, used for cooking food and warming water for stock in cold weather. On the second floor are fifty tie-ups for cattle, fastened with chains in the middle of stalls, allowing ample room to lie down and lick either side. They have water in front of them at all times. The upper floor is devoted to water tanks, shafting, and machinery. There are hay lofts of 300 tons capacity, which are filled from the center by a grapple fork. Water is supplied by a 16 foot geared Eclipse windmill, capable of producing the following results: In fair winds sawing ordinary cord wood two cuts, one cord per hour; grinding corn and oats into provender from five to twelve bushels per hour. In good winds it will run a corn and cob crusher and grinder, at the same time reducing the product of the crusher into fine cob meal at the rate of five bushels per hour. The machinery can be so arranged that it will not clog, and can safely be left to feed itself and grind out the grist.—*Country Gentleman*.

A MODERN RESIDENCE AT BELLE HAVEN PARK, GREENWICH, CONN.

We give on page 101 the perspective and first floor plan of modern residence built for Henry A. Adams, Esq., at Belle Haven Park, Greenwich, Conn. Is intended for all-year-round home, provided with an abundance of piazza. A pleasing exterior built of wood, the first story covered with clapboarding. Second story covered with cut shingles. Roof shingled. The interior is finished first class. The entrance is a wide low "Dutch" door, with a window at side glazed with stained glass. The hall is finished in oak. Staircase is furnished with arch and turned columns, open fireplace in hall. The floors are in oak. Wainscoted and paneled ceiling. Rooms are divided by portieres.

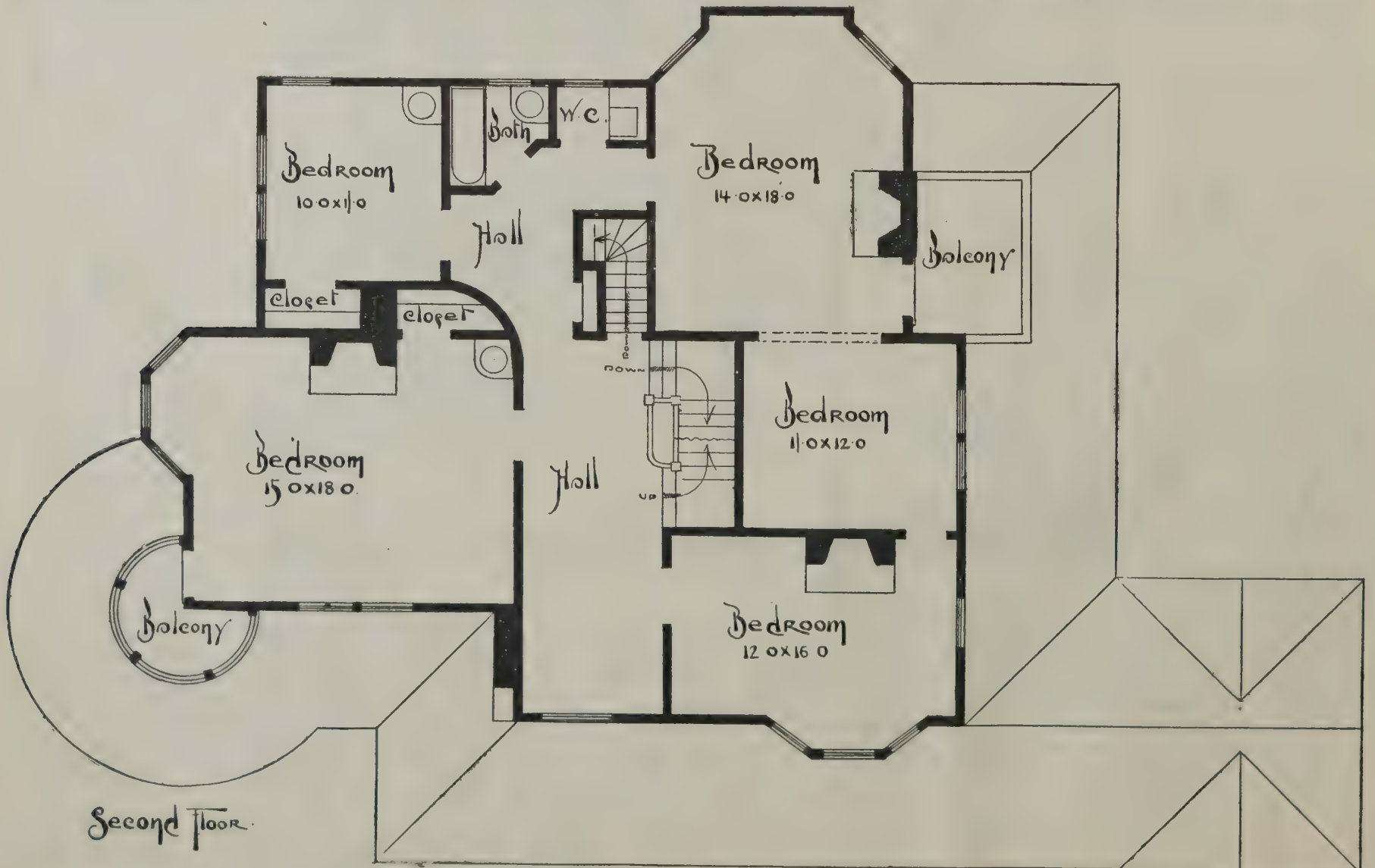
The library and drawing room are finished in cherry, the study in whitewood, and the dining room in oak, with wainscoting and ceiling beams similar to halls.

The butler's pantry is fitted up with drawers, cupboards, shelves, etc. The kitchen is wainscoted.

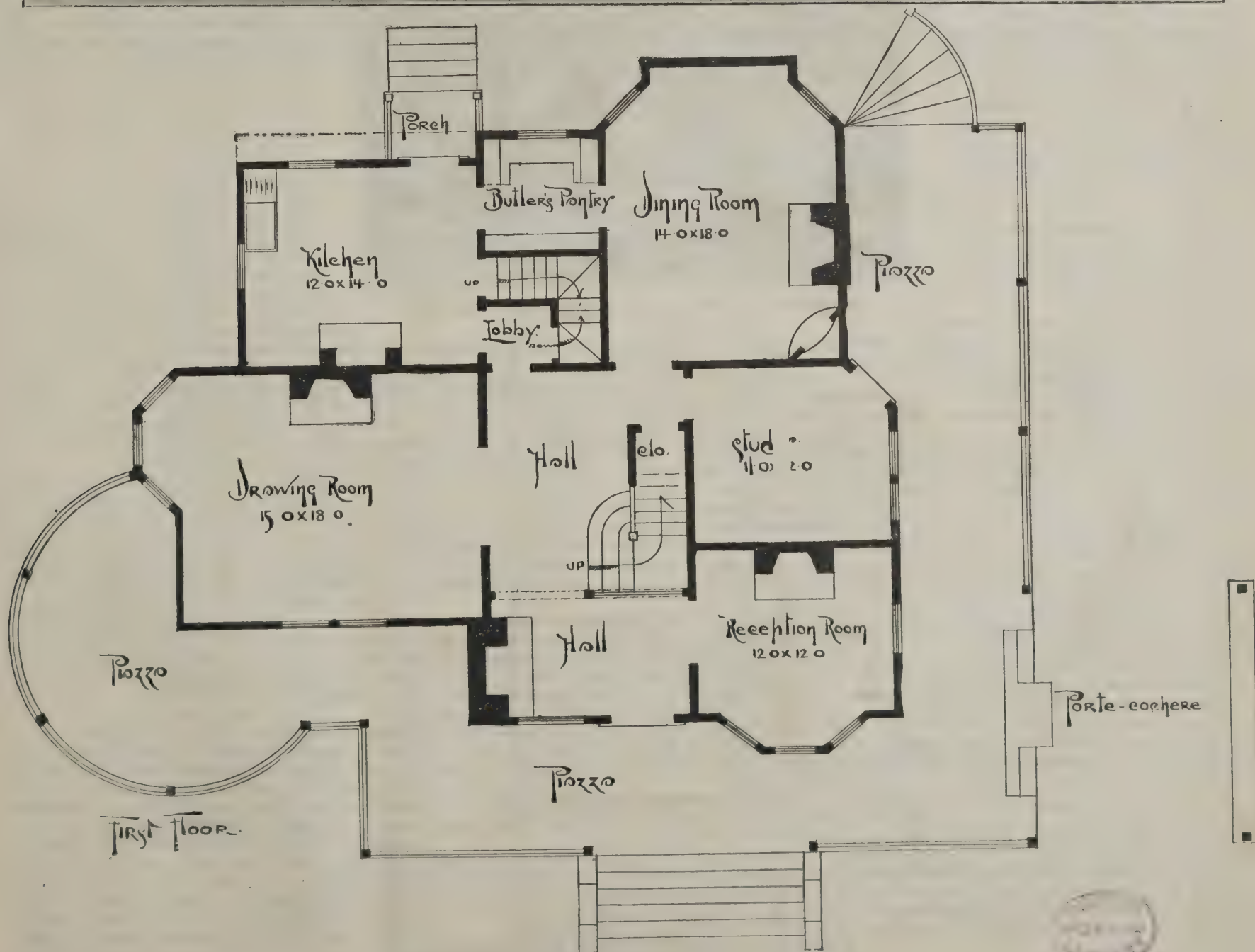
There are four large bedrooms on second floor. Two are finished in oak, two in cherry, provided with closets, etc. Also billiard room in attic.

There is a cellar under whole house.

Our engraving is made direct from a photograph that was taken especially for the SCIENTIFIC AMERICAN.



A RESIDENCE AT BELLE HAVEN PARK.



A RESIDENCE AT BELL HAVEN PARK. [See page 100]

THE WEEPING LARCH. (*Larix europæa pendula*.)

Few trees are so seldom used for purely ornamental purposes as the common larch. Yet in the weeping form, that is so well depicted in the accompanying engraving, we have certainly one of the most distinct and desirable of hardy conifers. As a lawn specimen, and particularly when associated with such stiff and somewhat formal trees as the Lebanon cedar and Swiss stone pine, the pendulous or weeping larch is at all times an object of admiration. More so than perhaps any other conifer, the weeping larch requires plenty of room for its free and perfect development, for if hemmed in by equally robust subjects or overshadowed by taller trees, that free and easy outline for which it is so remarkable is quite lost. I would certainly in planting this larch assign to it a sheltered situation; not a spot where never a blast of wind can ruffle its elegant foliage, but where it will be preserved from what I might term hard and long-blowing gales.

One would fancy in reading up the few notes that are to be found concerning the weeping larch that it is a scarce and low-growing tree, but this is by no means the case, as specimens of almost equal proportions to the majority of those of our normal type are to be met with. Not a dozen years ago Cambria could boast of perhaps the finest, certainly the largest, specimen of the weeping larch in this country; but unfortunately, owing largely to ignorance and caprice, this unique tree was laid low. After it was felled an opportunity occurred for me to measure the straight and well rounded stem, and it contained rather over 60 feet of wood, this being in nowise different from that of any other larch of the thousands I have seen cut up. It must be borne in mind, however, that this particular tree was not the so-called American weeping larch (*L. pendula macrocarpa* or *americana*), but simply a pendulous form of the European tree. Young trees of the American weeping larch are certainly, when well grown, very beautiful, and there are several notable examples in this country; but in my own opinion the one just described can compare with it very favorably.

Soil would not seem to be a potent factor in the cultivation of these larches; but in order to prevent heart rot and "pumping," avoid that of a gravelly or sandy nature.

In the best forms of the European weeping larch the foliage, or rather branchlets, is long and pendulous, often hanging for fully 30 inches from the main branches, and the tree is then most interesting, but particularly at the time when the cones assume that ruddy tinge that associates so nicely and markedly with the almost pea green foliage.—*A. D. Webster, in the Garden.*

A COTTAGE AT BEDFORD PARK, N. Y.

Dimensions.—Width 30 ft., depth 48 ft. 6 in., not including porches.

Height of first story is 9 ft., second 8 ft. 6 in.

Foundation stone and the underpinning brick; building above this, with the exception of chimneys, built of wood. Extension covered with clapboarding and shingles. Roof shingled.

The hall is finished in oak.

The parlor and dining room are finished in cherry and have open fireplaces.

Dining room provided with china closet, fitted up with drawers and shelves. Butler's pantry fitted up with sink and dresser, with shelves, drawers, and cupboards complete.

The kitchen is wainscoted.

Large store, pantry, and laundry, fitted up with wash trays, etc.

Second floor contains four bed rooms, bath room and a linen closet.

Bath room wainscoted similar to kitchen.

There are two bed rooms finished off in attic, besides plenty of room for storage.

Cellar under whole house, with a cemented bottom. The house is piped for gas and is furnished with electric bells, etc., and all the modern improvements.

Cost \$8,500. In some localities it can be built for less. Our engraving, on page 105, was prepared direct from a photograph that was taken especially for the SCIENTIFIC AMERICAN.

LIMESTONES weigh from 112 to 185 lbs. per cubic foot. The lighter weight is that of shell limestone from San Augustine, Florida; and the heavy, a semi-crystalline rock from Doughertyville, Tenn. As would be expected, the heavier stone is more durable, being more compact and thus less liable to disturbing atmospheric influences.

ST. CLOUD PRESBYTERIAN CHURCH, ORANGE, NEW JERSEY.

This church has a picturesque appearance, is built of brownstone laid in red mortar. Tower and gables in chapel are covered with cut shingles; the roof is covered with octagonal cut slates finished with a cresting and finials.

Porches at entrance have balustrade of brownstone. Turned columns support the porch roofs.

The inside dimensions of the auditorium are 35×58, and will seat 250 persons.

The walls of the interior are plastered, finished in tints. Woodwork finished in the natural. The trim throughout is of hardwood. Stained glass windows.

The study is 8' × 10' 6", fitted with book cases.

The chapel or Sunday school room is 20×25, and is finished similar to church. Cost \$7,500, everything complete, tiling, furniture, lighting, furnace, fence, and all fittings and fixtures, exclusive of the chapel. Potter & Robertson, architects, New York.

Our engraving, on page 108, is made direct from a photograph of the building taken especially for the SCIENTIFIC AMERICAN.

Nashville's Estimating Rules.

The rules under which estimates in the building trades will hereafter be submitted in Nashville, Tenn.,

and no estimate should be considered if received after that time has expired.

9. Contracts should be awarded within ten days from the time of closing estimates.

10. Architects should invite to bid on the work only those from whom they desire an estimate on that particular job.

11. All bids received from those not invited should be excluded.

12. No contractor should make an estimate in an architect's office unless invited to do so.

13. When a contract involves the taking down or using the material of an old building, it should be fully set forth in the specifications.

14. No bids should be exhibited or made known by either architect, owner, or principal contractor before the time for closing estimates on the job.

15. No contractor should be allowed to alter or amend his bid after the time of closing estimates.

16. Contractors should decline to give estimates in the aggregate when bids are being received under the separate heads. Sub-contractors should also decline to give the architect or owner an estimate for his branch of the work when bids are being received for the work as a whole.

17. When the contract is to be completed within a certain time, that fact should be mentioned in the specifications, giving the date; and if a penalty for non-completion by the specified time is to be exacted, it should be so stated.

18. The bidder to whom a contract is awarded should be required to sign a contract and furnish bond or withdraw his estimate.

19. The principal contractor should pay the sub-contractor in the same manner that the sub-contractor receives his estimates from the architect, when the work is let separately, to wit: 75 per cent. as his work progresses, and a final payment when his branch of the work is completed satisfactorily.—*Sanitary News.*

Selected Lumber.

Yellow pine has become the thing for girders and joists in heavy structures wherein iron is not used. It sells from \$26 to \$28 a thousand—the variation in price being dependent on specifications as to sap or no sap.

Cypress will be employed as a finishing wood, and for special uses, like tank and tub making, greenhouse frames, etc. There is not a sufficient supply available to attract the efforts of the general lumber dealer. Besides, the quality of cypress greatly varies with different localities of growth. Dealers are obliged to make a careful selection of stocks, and go far away to find them.

There is a fair distribution of inch red oak for house finish, the larger portion being plain-sawed stock, though good quarter-sawed lumber is salable. There does not seem to be much overstock of inch red oak that is sufficiently dry for use. The demand keeps up well, and promises to be steady. Red oak has become a staple in the hardwood lumber trade.

It is generally assumed that Northern white ash is the thing for machine and wagon work. Not until recently would manufacturers look at any timber that grew south of the Ohio River. But they are getting over that. Necessity has overcome prejudice. Now that Southern ash must be used, manufacturers are surprised to find it of excellent quality.

Cherry is a wood of distinctive character as much as walnut. It is in the heyday of its popularity. The demand is constant. It is peculiarly a cabinet wood, and has the merit of being bright and cheerful. For this reason it has crowded out walnut to a considerable extent. The supply of cherry of a good quality is limited, and, therefore, prices are easily maintained.

Chestnut lumber has lately attracted some attention as house finish, and is being worked up into moulding.

There is considerable trade in basswood, elm, and black ash. The moulding, picture frame and cheap furniture makers take kindly to these low-priced woods. *N. W. Lumberman.*

If any of our readers have made an invention for which they have thoughts of taking a patent, they are invited to communicate with Messrs. Munn & Co., the publishers of this paper, who for a period of forty-three years have conducted a most successful bureau in this line. A pamphlet of instructions will be sent free, containing full directions how to obtain a patent, costs, etc. In very many cases, owing to their long experience, they can tell at once whether a patent probably can be obtained; and advice of this kind they are always happy to furnish free of charge. Address Munn & Co., SCIENTIFIC AMERICAN office, New York.



WEEPING LARCH (*LARIX EUROPEÆA PENDULA*).

are given below as an example of the effect of concerted action in the direction of uniformity:

1. General drawings, when offered for final or competitive estimates, should be presented on a scale not less than one-eighth of an inch to the foot, and details not less than three-fourths of an inch to the foot. These should be done in ink or by some process that will not fade or obliterate, and be complete in all parts. Specifications should also be presented in ink.

2. The specifications, figured drawings, and details should be taken as the guide for estimating, and all demands made by the specifications or said drawings should be covered in the estimates offered, unless objection be made thereto in writing when the estimate is submitted.

3. Specifications should be plain and definite, and everything required in the various branches of work should be mentioned, described, and grouped under appropriate headings—each trade to itself.

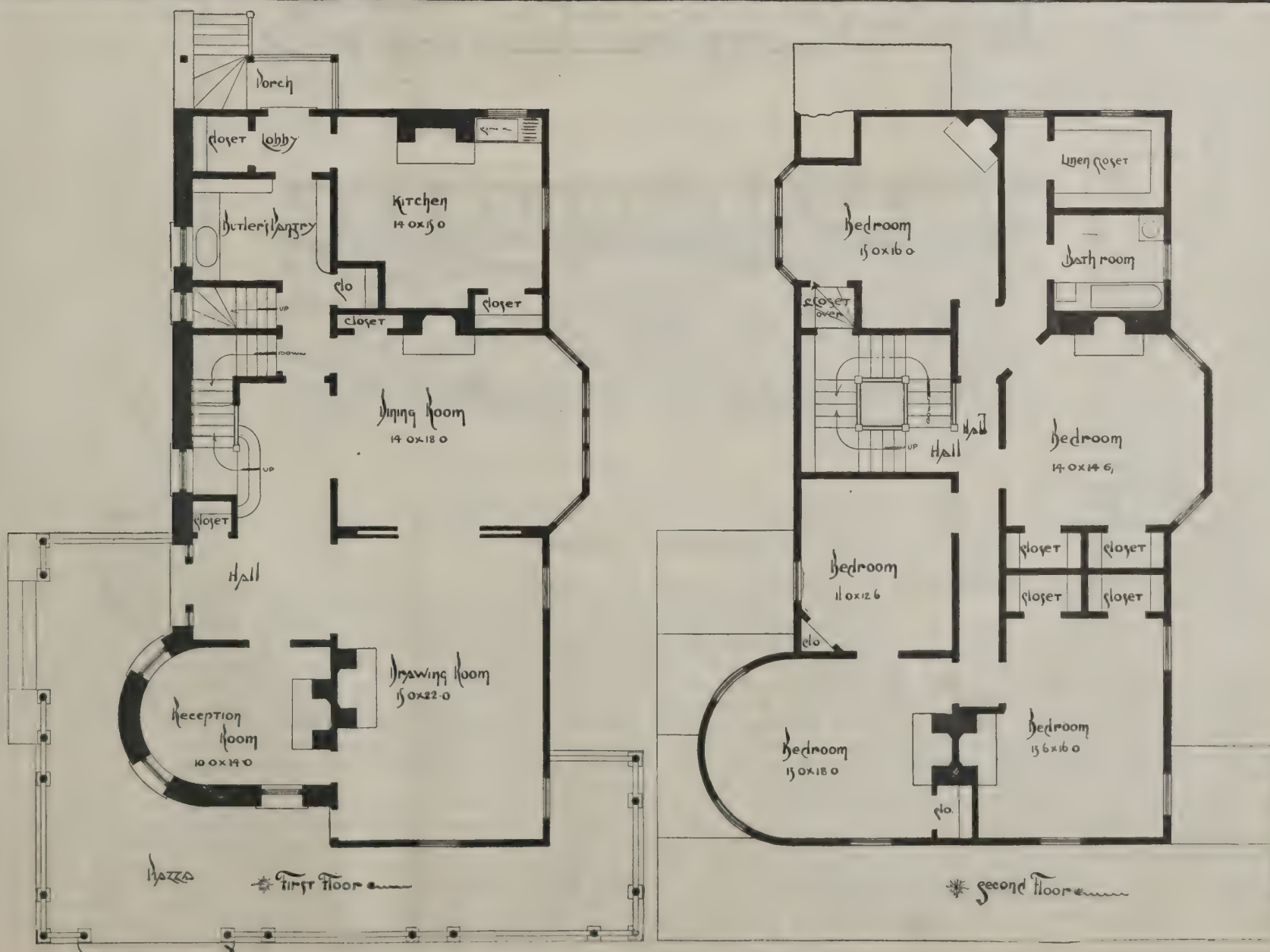
4. When the specifications require goods of a certain manufacturer, or material of a certain quality, the name and catalogue number of such manufacturer's goods, and the trade mark of such material, should be mentioned in the section to which such goods or materials belong.

5. Bills of quantities should be left to the intelligence of the contractor, and shall not be required of the architect.

6. Contractors should be responsible to each other for work damaged during the erection of the building.

7. When the contractor for the whole is to be restricted as to whom he shall employ as sub-contractors, that fact should be named in the specifications.

8. Contracts should be closed at some stated time,



A HOUSE IN THE COLONIAL STYLE.

The Science of Dry Rot.

Professor Bidlake, Rhode Island, reports as follows on dry rot in lumber: No wood which is liable to damp, or has at any time absorbed moisture and is in contact with stagnant air, so that the moisture cannot evaporate, can be considered safe from the attacks of dry rot. Any impervious substance applied to wood which is not thoroughly dry tends to engender decay, as floor covered with kamptulicon and laid over brick arching before the latter was dry, cement dado to wood partition, the water expelled from the dado in setting and absorbed by the wood had no means of evaporation. Wood-work coated with a paint or tar before thoroughly dry and well seasoned is liable to decay, as the moisture is imprisoned. Skirtings and wall paneling are very subject to dry rot, and especially window-backs, for the space between the wood-work and the wall is occupied by stagnant air; the former absorbs moisture from the wall, especially if it has been fixed before the wall was dry after building, and the paint or varnish prevents the moisture from evaporating into the room. Skirtings thus form excellent channels for the spread of the fungus. Plaster seems to be sufficiently porous to allow the evaporation of water through it; hence probably the space between ceiling and floor is not so frequently attacked, if also the floor boards do not fit very accurately and no oil-cloth covers the floor. Plowed and tongued floors are disadvantageous in certain circumstances, as when placed over a space occupied by damp air, as they allow no air to pass between the boards, and so dry them. Beams may appear sound externally and be rotten within, for the outside, being in contact with the air, becomes drier than the interior. It is well to saw and reverse all large scantling. The ends of all timber, and especially of large beams, should be free, for it is through the ends that moisture chiefly evaporates. They should on no account be embedded in mortar. Inferior and ill-seasoned timber is evidently to be avoided. Whatever insures dampness and lack of evaporation is conducive to dry rot, that is to say, dampness arising from the soil, dampness arising from the walls, especially if the damp proof course has been omitted, dampness arising from the use of salt sand and dampness arising from drying of mortar and cement. Stagnation of air resulting from air grids getting blocked with dirt or being purposely blocked through ignorance. Stagnation may exist under a floor, although there are grids in the opposite walls, for it is difficult to induce the air to move in a horizontal direction without some special means of suction. Corners of stagnant air are to be guarded against. Darkness assists the development of fungus; whatever increases the temperature of the wood and stagnant air within limit also assists.

Sewage a Protection against the Tereido.

The piles in process of removal at East Street, in front of the ferry landings, San Francisco, are in almost as good condition as the day they were put down. This fact has astonished a good many people who have been experimenting for years to find some substance that would put a stop to the ravages of the tereido. It has been found that where the sewers empty into the bay and wash up against the wharf pillars there is no indication of decay, while further out in the water the tereido works as actively as ever. This is the best possible testimony in regard to the powers of the San Francisco sewage, which is strong enough to corn anything from a pile to a tereido.—*Pacific Lumberman*.

Hot Air vs. Steam.

The discussion of Dr. Thomas Hubbard's paper on "Hot Air vs. Steam for Heating and Ventilating," at the Canton, Ohio, Sanitary Convention, developed into quite a factional fight, the partisans of the two methods being ranged in close ranks. J. J. Clark, a member of the Board of Education, related an incident which he said showed the origin of some of the rumors that the hot-air system was the cause of bad odors. "I was," said he, "a member of the Board of Education at the time of its introduction. I am willing to take a large share of the responsibility of having introduced it. I will relate an instance, to show how these reports have gotten abroad. Mr. Shaw, principal of the school, said to me one day: 'There are bad odors in the school rooms.' This was about a month after its introduction.

were heard expressions on all sides, from the children: 'Oh, an odor from the water closet!' I challenge any one to find any fault with this system, as operating here, and earnestly request every skeptical person to investigate for himself."—*Sanitary News*.

The New Catholic Cathedral at Pekin.

The new cathedral in Pekin, which is to take the place of the Pei-tang, removed two years ago from the neighborhood of the Imperial Palace, after having for many years excited the irritation of the Chinese, is now complete externally, and was consecrated on December 8. Abbe Faires, of the Lazarist Society, designed the edifice and superintended its construction. The internal decorations remain to be completed, and will take several months. The organ is described as a masterpiece of Cavaille de Col, of Paris, and the painted windows, which are also fine works, are in their places. The glass, which was brought from France, arrived in Pekin in excellent order. The building is not so large as the granite cathedral in Canton. The total interior length is 248 ft., breadth of transept 108 ft., breadth of nave 52 ft., height under the beams 50 ft., height under the arched roof 60 ft. The height was fixed in a convention between the Chinese government and the Lazarist Mission, and one of the conditions imposed was that there should be no tower. These conditions added to the difficulties of the architect, but he is said to have overcome them, and the design is pronounced "noble, harmonious, and beautiful." It is said that the Chinese government were to send representatives of high rank to take part in the ceremony, "as by the cession of the mission's former site in exchange for the grounds now occupied, a troublesome and even dangerous question has been laid finally at rest, to the perfect satisfaction of the Imperial Court, the Tsung-li-Yamen, and Chinese public opinion—the last an important element in the matter—and, on the other hand, to the satisfaction of the Catholic mission also."

Advantages of Sanitary Measures.

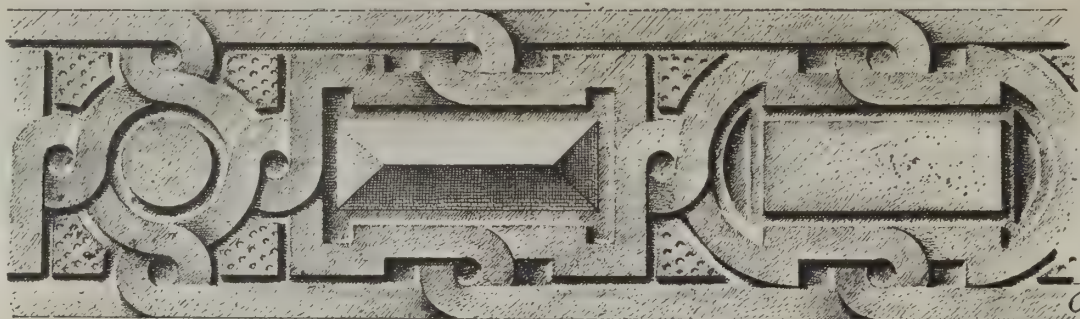
Dr. P. R. Inches, in a recent address before the New Brunswick Medical Society, instanced the city of Edinburgh as showing the benefits resulting from the intelligent use of sanitary and preventive measures. In 1862 the population of that city was 176,000, the deaths 4,661. In 1886 the population was 211,400, but the deaths were only 4,149—a fall of death rate from 26.65 to 19.62 per 1,000; and the change took place mainly in the diseases most influenced by sanitary precautions—the zymotic class. In 1862 that group accounted for 19.73 per cent. only, and this change represents a continuous fall in the percentage. In some

of the poorer and overcrowded districts of the city there was a decrease of mortality varying from 3.77 to 20.71 per 1,000. Such diminution of mortality implies an immense saving of life, and is attributed by the authorities to relief from overcrowding, to the opening of new streets and breathing places, better water supply, new drainage, improved plumbing, and to the system of notification of infectious diseases and to the isolation and removal of the infected and disinfection of the place.—*Medical Science*.

FULL plans, specifications, and details ready for the builder, of any of the houses illustrated in this publication, may be had on moderate terms at this office. Special plans and specifications for the erection of buildings of all grades are also supplied by us. Munn & Co., architects, 361 Broadway, New York. Plans for the alteration and enlargement or improvement of buildings are also supplied.



A, B et D Bordures sculptées dans une chapelle

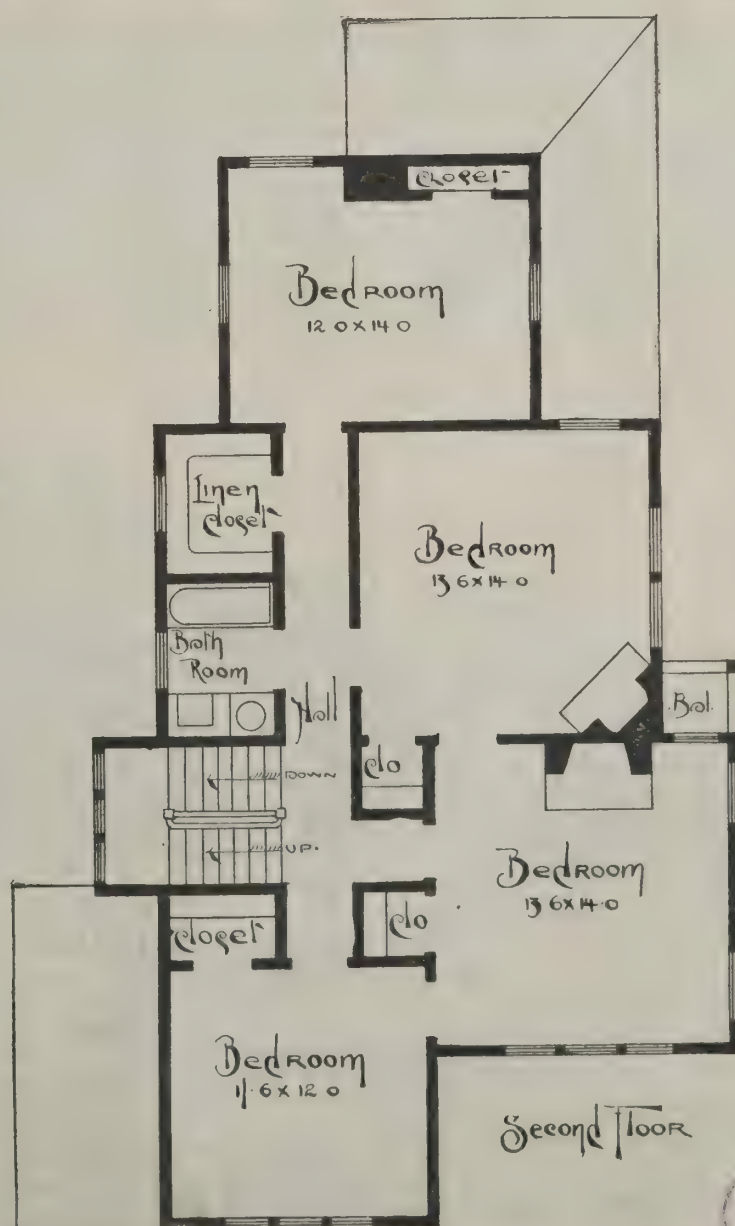
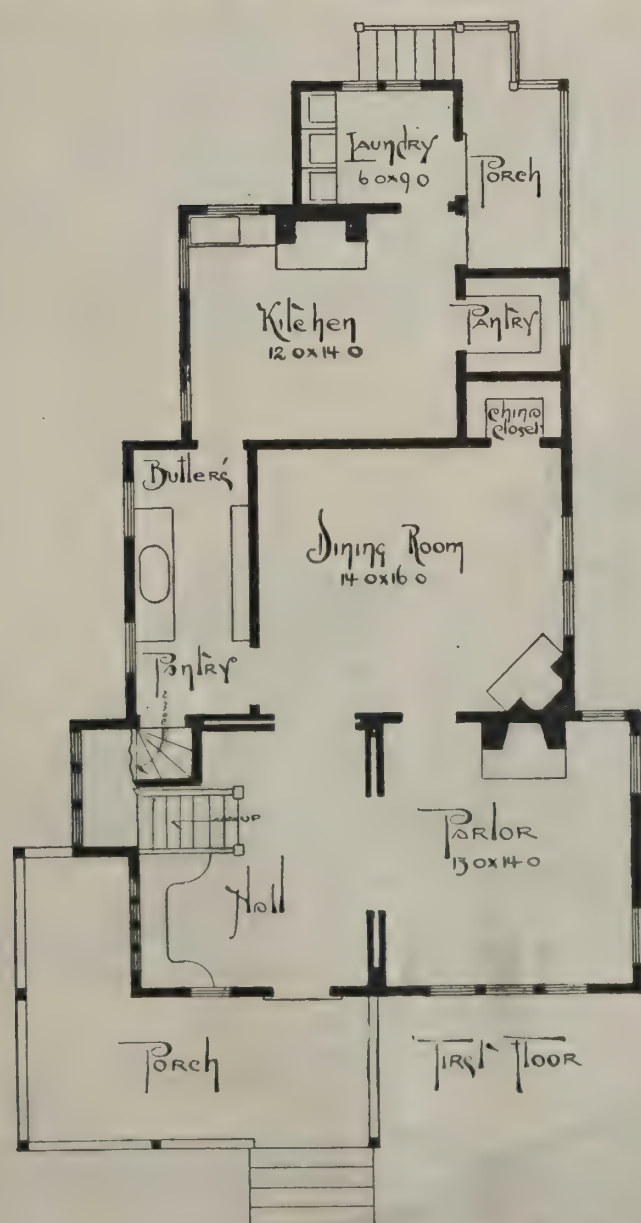
de l'Eglise de S^t LAURENT à NOGENT-S-SEINE

C. Chateau DU PAILLY (Haute-Marne)

Sculptures du XVI^e Siècle.

ORNAMENTAL BORDERS.

With another member of the Board of Education I proceeded to investigate. I found that a property owner abutting on the school grounds was on that day excavating, or rather cleaning, an old vault that stood near the line. At the same time he was burning the rubbish on the lot. The day was a sultry one, and the smoke was driven toward the school building. We called Mr. Shaw around to that side of the building, and he immediately said, without our having called his attention to the vault, 'Why that is the same odor that I noticed in the school rooms,' and afterward said that there had been an odor of smoke in the school rooms at the same time that the other odor was perceptible, thus proving the source of the odors. On another occasion, when odors were complained of in the school room, we decided upon investigation that they came from the laboratory above, when gases were being generated; and in proof of this, Mr. Shaw took samples of the gas and opened them in the school room. Soon



A COTTAGE AT BEDFORD PARK.



THE EIFFEL TOWER AT THE FRENCH EXPOSITION.

Our illustrations represent the positions of the foundations of the four great inclined legs on which the tower rests, the manner of supporting these inclined legs before they had been connected to form the sup-

of the Bastille, the overturning of the monarchy of Louis XVI., the reign of terror, and the evolution of Napoleon Bonaparte.

It would be impossible, in such brief mention as we can here make, adequately to enumerate all of the

economic uses steel can now be applied. A large portion of this hall of wonders is occupied with exhibits of new American machinery.

The great tower, which is probably the most striking feature of the exposition, is 300 meters, or over 984 feet,



THE FRENCH EXHIBITION—MOUNTING ONE OF THE TRUSSES OF THE 984 FOOT TOWER.

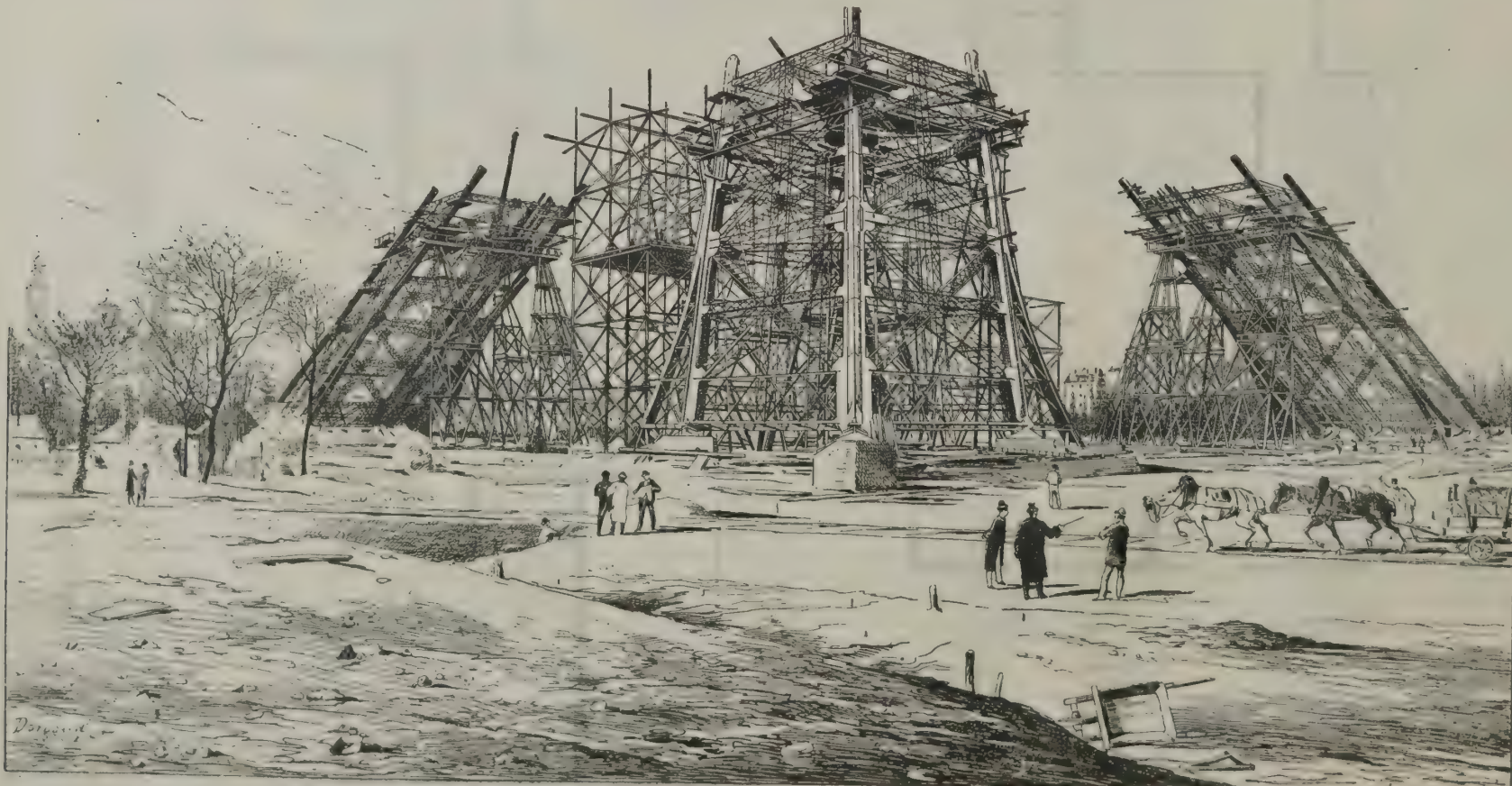
ports of the vertical structure, as well as a bird's eye view of the exposition buildings, of which the arches forming the base of the tower may be considered as the main entrance. We also give a view of the tower from a distance, showing how it overtops its own neighborhood and dwarfs all other buildings in Paris.

The exposition was opened to the public on Sunday, May 5, 1889, with the considerable pomp and circumstance which great occasions usually call forth in the French capital, the date of opening being fixed to commemorate the centennial of the meeting of the States General in 1789, which was so soon followed by the fall

principal features of the great industrial triumph of which this exposition is the vital exponent. The machinery hall, for instance, in the general plan we give, occupies a comparatively small space at the rear end of the great rectangle occupied by all the exposition buildings, but this hall is itself 492 feet wide by 1,387 feet long, and is constructed entirely of steel. The building is bold in conception, admirably adapted to the purposes for which it is erected, and it is said that it embodies the entire progress thus far made in the art of the engineer in structural work, being itself an evidence to the world to what serviceable and

high. In making its foundations, which are inclined, the soil was so uncertain and variable, near as it was to the banks of the Seine, that caissons had to be employed. Upon the two piers near the Seine the foundations were carried to a depth of 46 feet, while those near the city side were not carried so deep. To regulate, however, any possible deflection of the tower from these differences, great hydraulic jacks were inserted in the iron shoes by which the iron work was attached to the masonry.

It was afterward found that, when the meeting points of the inclined portions of the tower had reached their



THE FRENCH EXHIBITION—THE INCLINED BASE COLUMNS AND SCAFFOLDS OF THE GREAT TOWER.

ultimate height, and before the vertical section had been commenced, there was a variation of a small fraction of an inch in the different heights of these inclined portions, and this small variation was remedied by the jacks.

The iron trusses that rise on the foundations have an inclination of 54°. Each truss is fixed to the masonry through an iron shoe capped by a steel plate weighing 5,500 lb.

The trusses were put up in sections riveted to one another and cross-braced, balancing upon each other, and mounted without external help to a height of about 85 feet. Then came into play the frames shown in our second engraving. After this the operation was as follows: In the interior of the uprights of the tower are arranged beams that have a plane surface, and served for the rising of the elevators. The builders of the tower conceived the ingenious idea of using these, in measure as put in place, for the continuation of the work. To this effect, four cranes, of 38 feet sweep and of 6,600 lb. power, were mounted on these beams, which served as slides. When a new section was constructed, the crane was raised to the following story, and so on.

At the height of 140 feet, the uprights thus constructed, and forming the sides of four great inclined trapezoids, were ready to receive the four horizontal trusses forming the first story of the tower. For this purpose the large central scaffolding shown in our engraving was used. When this operation had been performed there was at the disposal of the builders a wide and rigid base, at 150 feet from the ground, that allowed them to proceed safely and progressively, and with much ease, as the weight of the pieces, their size, and distance apart continued to diminish.

American elevators of the Otis pattern are employed in its inclined portion. The actual length of the travel of the elevators in this curved part is 493 feet, although the vertical elevation thus reached is only 372 feet. The angle of inclination in the legs of the towers varies from 54 degrees at the start to about 80 degrees at the finish, but the elevator carriages are so hung as to accommodate themselves to the varying angle. The elevators are designed to make the journey from the ground to the second landing, nearly 500 feet, in about a minute. At both of these landings there are restaurants and cafes, where visitors can get their meals and have social intercourse while at an elevation from which they can overlook the city and surrounding country. The tower is intended to sway slightly with very high winds, but is acknowledged to be a very strong and safe construction.

The tower is surmounted by an electric light of such enormous power that it is said fine print can be read at night at a distance of a mile and a quarter.

Which are the Hardwoods?

With the majority of lumbermen the term hardwood includes everything except white pine, and is accepted in that sense generally by the trade, though in reality there are two or three woods, such as buckeye and Southern white lynn, that are softer than white pine. Some writer, we know not who, says: "The relative

all notice it. The room is large and high and light. One end, that to the south, is rounded, forming a homelike room for plants. A bed of deep earth borders this conservatory, and in it flourish ivys and blooming vines and gay geraniums and the prolific heliotrope, with a hardiness which only such a permanent abiding place could give. Deep red curtains, well drawn back, only partially divide this generous bay window from the main room, which, while adorned with pictures and vases and other bits of prettiness, has no ornament comparing to the freshness of growing plants and the fragrance of their blossoms.

The floor of polished oak is covered with a Brussels mat of chaste and quiet pattern. A leather-covered table, strewn with magazines and papers, stands under the chandelier, and is surrounded by half a dozen rocking chairs and two or three with arms. Uncomfortable seats are banished to a parlor for which the members of this family have no use.

A lounge, furnished with pillow and soft afghan, tempts the lazy and the sleepy to its corner. The writing desk occupies another; and the largest wall space is utilized for an open case where books of reference and other books in constant use are placed; underneath are two rows of drawers and a cupboard with closed doors, the top of which forms a convenient space for atlas, globe, and dictionary.

Directly opposite, a fireplace and oak mantel complete the cheerful picture, and in cold weather add to

the warmth and brightness. An air of perfect cleanliness impresses the casual visitor, and is accounted for by those who know that twice a week, on Wednesday and on Saturday, the furniture is taken out and cleaned, the ornaments removed and dusted, the carpet swept, the floor wiped with damp cloths, and every part of the large room made free from dust. Every day there are the marks of dirty boots and sticky fingers to remove, blocks and dolls to be put away, papers to fold and chairs to replace; for children and grandchildren call this "Home," and come to its mistress for advice, for comfort, and for happy intercourse. —*Good Housekeeping.*

It is reported that a small fly is attacking and killing the spruce trees in certain portions of the province of Quebec. It is about five-eighths of an inch long, and has four wings of a brownish color. It has also done its work of devastation in Vermont and New Hampshire. A Quebec limit is mentioned where trees that were perfectly sound four years ago have been killed in great number, two-thirds of value of the area having been destroyed.



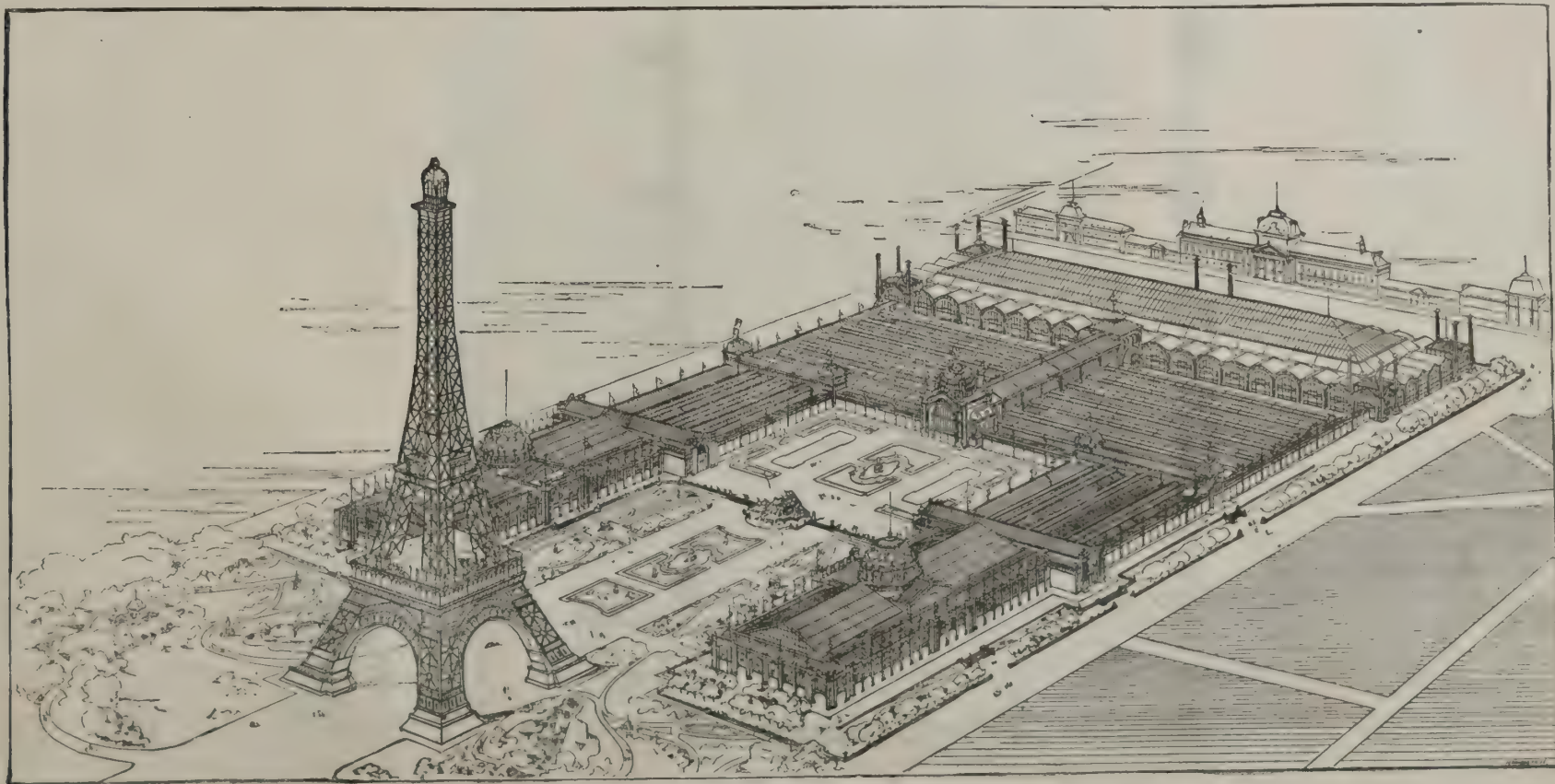
ASPECT OF THE EIFFEL TOWER AT A DISTANCE OF TWO MILES.

hardness of woods is calculated by the hickory, which is the toughest. Estimating this at 100, we get for pig-nut hickory 96, white oak 84, white ash 77, dogwood 75, scrub oak 73, white hazel 72, apple tree 70, red oak 69, white beech 65, black walnut 65, black birch 62, yellow and black oak 60, hard maple 56, white elm 58, red cedar 56, cherry 55, yellow pine 54, chestnut 52, yellow poplar 51, butternut and white birch 43, and white pine 35."

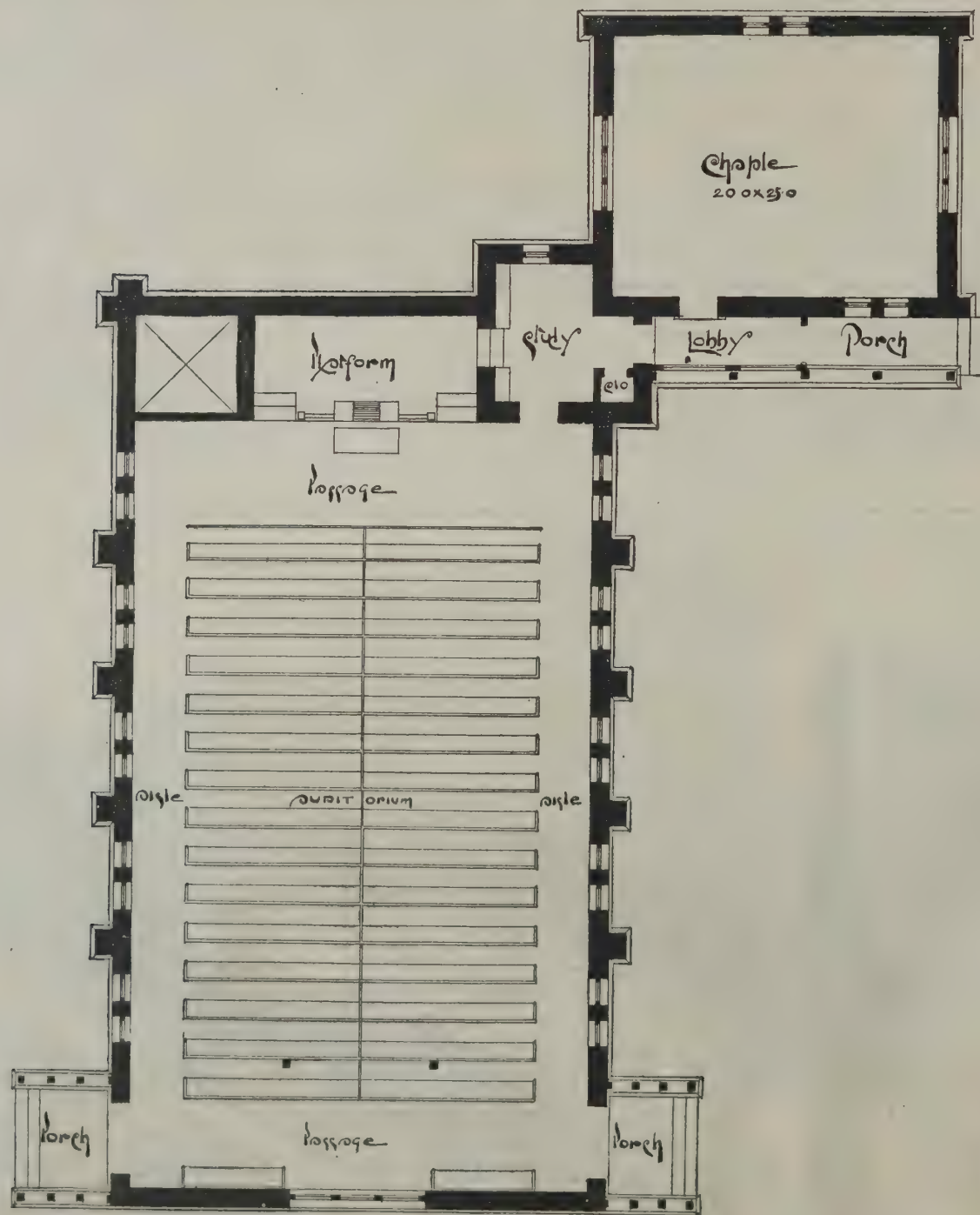
According to this formula, woods possessing a degree of hardness equal to only about 40 per cent., or less than that of hickory, should not be classed as hardwoods. Such woods are, however, limited in quantity, and are not of sufficient importance to justify a classification, and the trade will continue to construe hardwood to mean everything except white pine. —*Southern Lumberman.*

An Ideal Living Room.

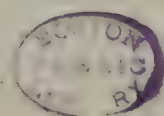
It is a real one, and so replete with cheerful brightness that its very atmosphere breathes welcome, and bids all who enter "Be at home." It is not easy to analyze this look of ineffable peace and homeliness, but



THE FRENCH EXHIBITION—THE GREAT TOWER AND BUILDINGS.



ST. CLOUD PRESBYTERIAN CHURCH, ORANGE, NEW JERSEY.



A WATER MOTOR FOR ELEVATORS.

In the accompanying illustration the Syracuse water motor is shown connected to an ordinary elevator, the motor being made in three sizes, depending on pressure and amount of load to be carried. These motors, made by the Tuerk Water Motor Co., of Syracuse, N. Y., have a governor which regulates and controls the flow of water equal to the amount of load carried. It is claimed that these motors use less than half the water of the ordinary hydraulic machines. They have no packing or valve to wear out.

Granite Rust.

In most granite countries a certain amount of iron is scattered through the rocks beneath the surface of the earth, usually in form of sulphide, crystallized in the well-known cubical, gold-colored particles of iron pyrites. The crystals of pyrites occur in many other rocks besides granite, more particularly, perhaps, in slate and coal, and are frequently supposed to be gold. Wherever they occur, they decompose on exposure to the weather, leaving ultimately a free oxide of iron, which is washed by rain over the surface of the stone. Many white or mottled marbles also contain iron, which slowly imparts to the surface, under the action of the weather, a warm burnt-sienna color. This is not a serious disadvantage to marble, but in granite the iron stain combines disagreeably with the natural color of the stone, and granites containing iron particles should be rejected. According to M. Detain, the French granites of a dark gray color are rarely, if ever, affected by rust. Those with white ground are more apt to contain iron, but are tolerably safe, while those with pink or red ground are almost sure to rust. With us, red granites are no more subject to rust stains than others. There are some red granites which contain iron, but there is at least an equal number of gray and white stones with iron particles in them, and as these soon assume an unpleasant appearance on exposure, new granites should be tested. The best test, and one which cannot be too strongly recommended to architects who have occasion to try a new stone, consists in a visit to the quarry, where its merits and defects may, with a little care, be ascertained with certainty; but washing the suspected stone with muriatic acid, and allowing the acid to dry on, will often bring out the color of iron. Singularly enough, the same means answer for removing the rust stains which have already formed on a stone. The muriatic acid readily dissolves the rust, and if it is then washed off with plenty of clear water, the stain will disappear.

VENTILATING GRATES.

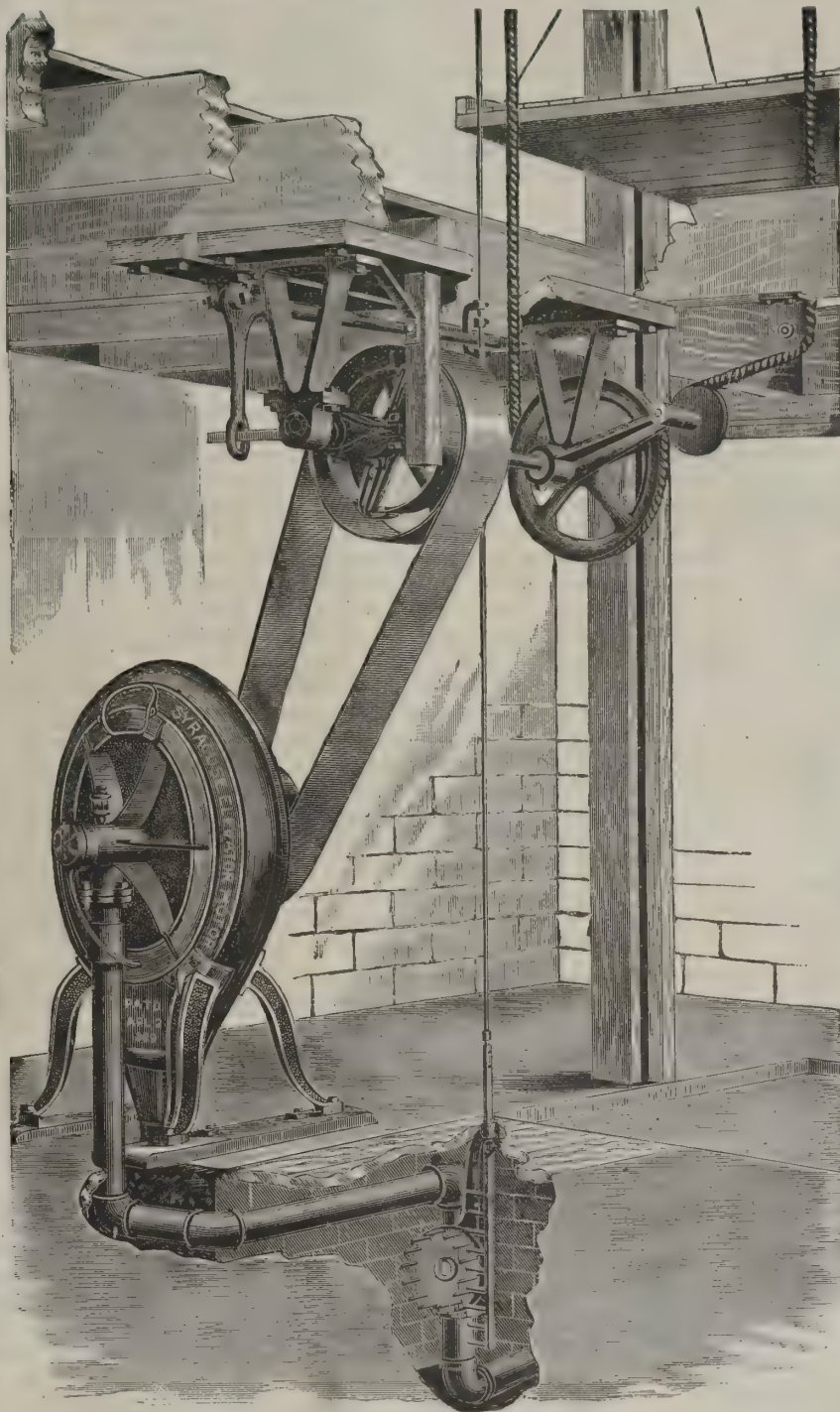
An open fireplace in a room, connected with a heated flue, or a flue adjoining a heated flue, is almost always an aspirator of the air of the room. When a fire is made in the fireplace the volume of this exhaust of the chimney is, obviously, largely increased. According to the estimates of General Morin, a blazing fire in an open fireplace may take from the room nearly 40,000 cubic feet of air per hour, or, in other words, it will empty a large room every fifteen minutes. So rapid is the ascending current of outgoing air that it carries with it the smoke and soot, and even small bits of the burning fuel. But the rushing from the room of such an immense volume of air necessarily implies the entrance into the room through some inlets of an equal volume of air from outside sources.

When the ordinary form of grate is used, this inflowing air enters

cold (if directly from outdoors) or not devoid of impurities (if from the adjoining halls). But a more serious defect in the ventilating offices of the ordinary grate is that this incoming volume of air, being cold, occupies the lower levels of the room, and passes in a

flue, while the pure, outdoor air, heated before its entrance, floods the room from above, and supplies an ever changing, healthful atmosphere to all parts of the room except very near the floor. And at all points of the room, there being no cold air currents, the temperature is uniformly maintained.

The illustration represents one of the many new and elegant designs of the ventilating grate made by Edwin A. Jackson & Bro., New York City.

**A WATER MOTOR FOR ELEVATORS.**

current mainly toward the fireplace, and thence up the chimney, while the breath and exhalations from the bodies of the inmates of the rooms, being warmer, ascend to the higher levels, and mix with the air above the breathing line.

In the ventilating grate herewith shown, the air en-

tering to replace that exhausted by the chimney comes in with a temperature much higher than that of the breath or other impurities; hence, the latter fall to the lower levels, and are constantly being carried off by the flue, while the pure, outdoor air, heated before its entrance, floods the room from above, and supplies an ever changing, healthful atmosphere to all parts of the room except very near the floor. And at all points of the room, there being no cold air currents, the temperature is uniformly maintained.

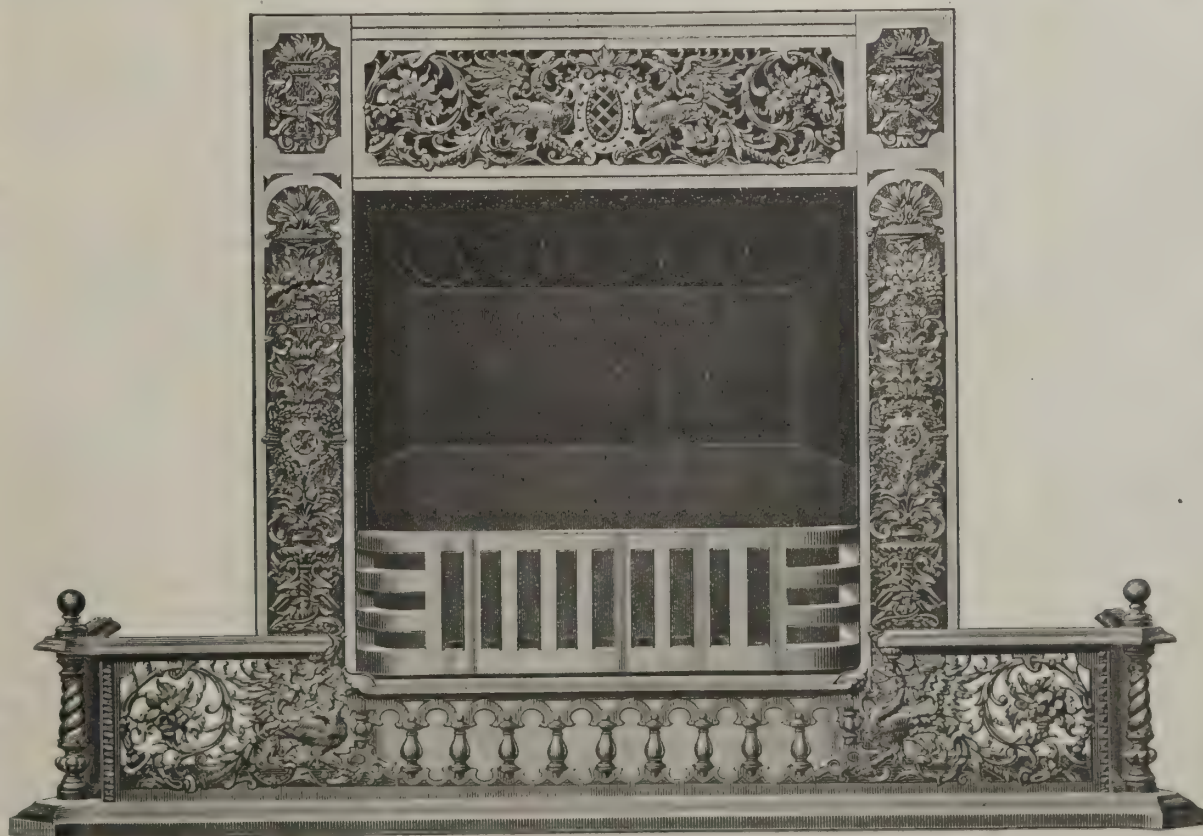
French Building Laws.

Mr. Francis Hooper recently read before the Royal Institute of British Architects an excellent paper on French building laws, the provisions of which become every day of more interest to the inhabitants of our growing cities. The general municipal regulations in regard to building in Paris, says *The American Architect*, are known to most of our readers, but a good deal is to be learned from the different customs prevailing in the provincial towns. Outside of Paris, for example, when it appears that the widening of a street or the removal of an obstruction will soon become desirable, a survey is made, the value of the land to be taken is appraised as if it were vacant, without regard to the buildings that may be standing upon it, and the town or city buys it at this valuation, stipulating with each owner that so long as the building upon his part of the land remains fit for occupancy he shall not be disturbed in the possession of it, but that no structural repairs shall be made to the walls or foundations of the portion standing on the land acquired by the public authority which would tend to prolong their existence. By this sensible arrangement the town or city acquires the land necessary for its future improvements without having to pay for any buildings on it, loss of rent, damage to tenants, or other expenses, and at a time when the cost of the land itself is probably much less than it would be later, when the improvements are actually in progress, while the expropriated owner is comforted by enjoying for some years, not only the undisturbed possession of his house, but compound interest on the value of his land, and the changes desired are effected as surely as by the methods in use here, and at a fraction of the cost, although the process is a slower one.

Mahogany.

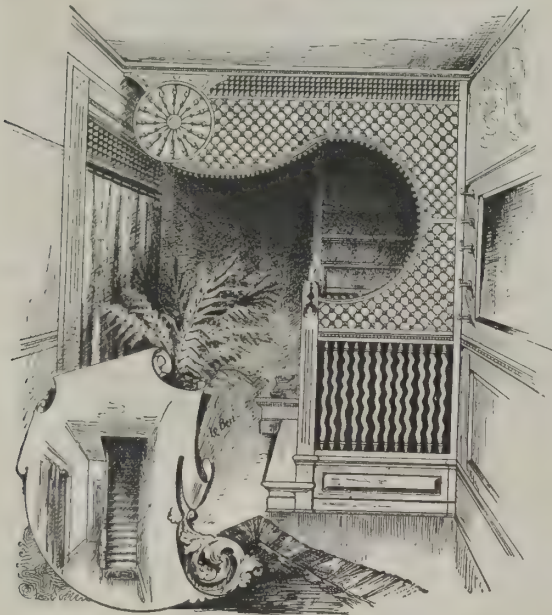
A marked feature of the hardwood trade at the present time, says the *Timberman*, is the increasing popularity of mahogany. The demand for this wood has outrun the expectations of importers, and reports from all markets are to the effect that stocks are low and prices very firm.

In New York it is difficult to get this beautiful wood at any price, and the London market is almost equally bare. The report from the last named market is to the effect that it is years since the sheds have presented so empty an appearance, while at the same time demand is very active, and the prospects for shippers very encouraging. The principal sources of supply of this wood are Honduras, Tobasco, Minatitlan, Mexico, and Cuba, in some of which countries it is found in quantities practically unlimited, and the growing favor with which mahogany is regarded will doubtless lead to a great expansion of operations in these tropical forests.

**VENTILATING GRATES MADE BY EDWIN A. JACKSON & BRO., NEW YORK CITY.**

ARTISTIC WOOD WORK.

The illustrations herewith represent some comparatively inexpensive and yet very ornamental adornments for which place may be found in almost any comfortable residence, without interference with the architect's plans. For instance, what could be prettier than the grille or lattice work to shield or partly inclose the entrance to a stairway shown in one of the views? But a little more room is taken, and the bottom step is set at a right angle with the stairs, as shown in the view of the old construction in the left hand corner, but how marvelously different is the general appearance! So also of the lattice with space for a music cabinet, surrounding the radiator. One has to see these little additions to the comfort and elegance of a home in actual use to fully appreciate their real value. The grille between the conservatory and a hall or entrance speaks for itself. Its richness of effect as a decorative work will be at once recognized. The carving of wood for house finish and interior decoration has become a distinct and permanent branch of industry. A good deal of such work has heretofore been done by amateurs, but builders and housekeepers who desire the best work and the finest effects, and can afford to have definite plans carried out, now find that they can do it at such small cost, that this class of decoration enters into the fur-



GRILLE TO SCREEN STAIRWAY.

nishing of a complete modern house almost as certainly as the work of the plumber or the carpet layer. In the woods there is not one but what will be beautified by carving. So common a wood as white pine is susceptible of producing very fine effects when the wood is left in its natural condition. When first worked it is a creamy white, well calculated to show the shadows of relief, and exposure to the air soon deepens its tint. A thin varnish of shellac will tone its whiteness without producing a shiny surface. Whitewood is also well adapted to carving, as are also the different varieties of maple and beech, the darker woods admitting of bolder relief, and making fine combinations with the darker woods.

The specimens shown herewith are the product of the manufactory of Messrs. Cutting & De Laney, of Buffalo, N. Y., who, besides making fine carved furniture, produce all kinds of East Indian, Japanese, and Moorish decorative lattice work. They also make decorative ceilings and borders, and ornamenta panels, and are constantly furnishing special designs to order.

Stains for Mortar and Plaster.

Messrs. S. Bowen's Sons, of Philadelphia, Pa., manufacturers of the well-known Pecora mortar stains, have issued a handsome souvenir containing photographs and line drawings of prominent buildings throughout the country in which these stains have been employed. These stains are principally used in red, brown, buff, and black, although other special shades are made. They are said to be free from gas, oil, and all other impurities tending to affect the hardening and enduring quality of mortars and cements, and are ground very fine, so as to readily mix into the mortar without streaking. They make a fast dye, forming a chemical union with the mortar, and rain, snow, heat or cold will not cause them to run or bleach.

An Enduring Tin Roof.

Messrs. Gummey, Spering & Co., importers of tin plate, write us concerning the extraordinary lasting power of a piece of tin lately taken off the roof of a building now being repaired. The tin was placed on the roof in 1825, the plates having been imported as bright plates and afterward dipped in a solution of lead, thus making the first terne plates in Philadelphia. The roof was not painted on the under side, but only on the outside, and the under side is said to be just as good as the day it was placed on the roof.

Wood Filling and Finishing.

Most of our readers know of, and many have made use of, Wheeler's patent wood filler which has for years given the best satisfaction for finishing and filling wood work.

Formerly the process used by many in finely finishing hard woods was slow and costly. Several years ago the Bridgeport Wood Finishing Co., of New Milford, Conn., patented a process by which both time and expense in finishing hard wood in its natural beauty is saved. This wood filler has satisfactorily stood all tests, and is to-day considered the standard. The patents which this company hold cover the use of silex as a wood filler, and these patents have been sustained by decisions of Judge Shipman in the United States Circuit Court, Hartford, Conn., also by the final decree for infringement and accounting by Judge Colt, of Boston.

The advantage of this new process is that by one application of the article, as directed, a smooth and perfectly transparent surface is immediately obtained, and upon which one or two coats of varnish will accomplish more than was obtained by the old process with more than double the number of coats of varnish.

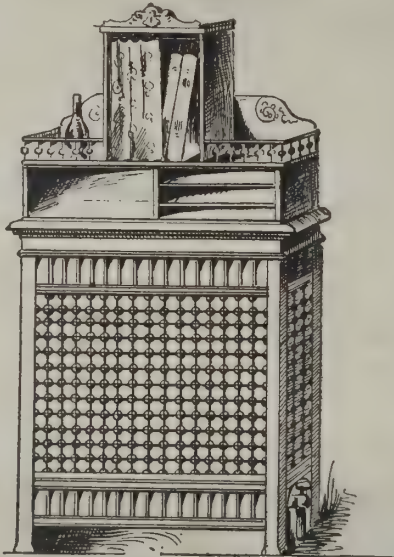
This company issue a very complete catalogue and price list, giving full directions for applying the wood filler, as well as the large number of preparations they prepare, such as Breinig's patent lithogen primer, for priming plaster, stone, brick, and wood; Breinig's lithogen silicate paints, wood dyes, or stains; Breinig's improved linseed oil drier, Breinig's light and dark oil finish, Breinig's floor polish, and numerous other preparations which are fully described in their catalogue, which will be gladly mailed to all applicants.

These goods are constantly used by the most prominent manufacturers in this country, such as the Pullman Palace Car Co., Wheeler & Wilson Mfg. Co., Estey Organ Co., Pottier & Stymus Mfg. Co., Chickering & Sons, Singer Mfg. Co., and others.

Shell Fish Marbles.

The Sussex and Purbeck marbles of England are almost wholly made up of the shells of fresh water mollusks, or shell fish. The two marbles differ chiefly in the size of the shells composing them.

In the coarse varieties of Sussex marble, the shells are decomposed, and the interstices left by their removal filled up with calcareous clay; but in the compact layers and blocks, the shells are transmuted into calcareous spar, and their cavities contain indurated marl and limestone, of various shades of gray, blue,



SCREEN FOR MUSIC STAND AROUND RADIATOR.

yellow, etc., interspersed with pure white, mottled with black; the polished slabs display innumerable sections of the inclosed shells, and rival in interest and beauty many of the foreign marbles. The black and dark-brown spots and veins in this and other shelly marbles have originated from the transmutation of the soft bodies of the mollusca into a carbonaceous substance, termed *molluskite*. Those shells which were empty at the period of their becoming embedded had their cavities filled with mud, silt, or other detritus, which has subsequently hardened into clay, marl, limestone, etc.; but those which contain the gelatinous bodies of the snails are occupied by a mass consisting of carbon and a large proportion of phosphate of lime. In the polished sections of the marble, this carbonaceous animal matter often appears in black or dark brown spots and veins; and the most beautiful slabs owe their variegated appearance to the contrast produced by the molluskite with the white calcareous spar. The Purbeck marble differs from that above described in being composed of smaller shells of the same genus, it also contains abundance of Cypridæ; and in some layers, small bivalves, replaced by white spar, give a variety to the markings exposed in the sections. The polished cluster columns in the Temple Church at London, in Canterbury Cathedral, and many of the monuments in Westminster Abbey, are of this marble; in other words,

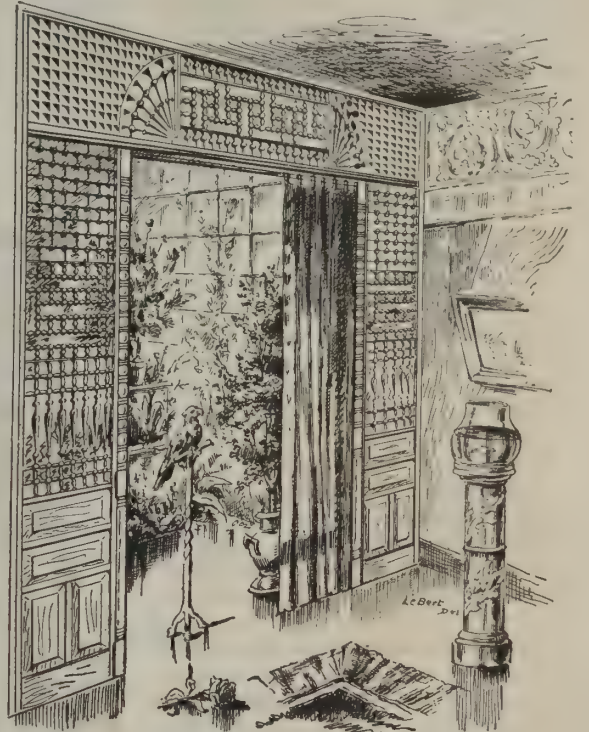
they are constructed of conglomerated masses of petrified shells of snails, which lived and died in the rivers that flowed through a country inhabited by the iguanodon and other extinct colossal reptiles, ages before a single layer of the chalk was deposited.—*Wonders of Geology.*

Fire-Resisting Ceilings.

It is a well-known fact that plaster on a ceiling surface, in the event of fire, will detain it for a long time, provided any means have been taken when applied to secure it under such circumstances; and were these means more generally employed, millions of dollars would be saved to this country annually.

As the fireproof construction is the exception, and as wood construction must predominate for years to come, therefore more attention should be given to making the latter structure more fire-resisting.

During the last twenty years I have devoted much thought to this subject, and some of the devices I have had in that direction I have sought to secure by letters



GRILLE BEFORE CONSERVATORY OPENING.

patent, and, strange to say, came in conflict with an English patent in the archives at Washington, bearing date 1797. The device then discovered has been slumbering there nearly one hundred years, and to-day I know of nothing more economical or effectual to secure plaster in position in the event of fire than this same device. It is simply a wire netting, as used to-day for a foundation, but, as there described, placed over the bottom surface of the plaster, and then securely stapled to the furring or joists, and afterward the finishing coat of plaster applied over the surface.—*James John, in American Architect.*

MR. W. R. EMERSON is remarkable among the architects of the East for the cleverness of his country and seaside house work and the beauty of their exterior coloring, and it may interest our readers to know what he is doing at this time.

He has recently erected a group of five cottages on the beach at Newport, all of which are stained with very soft shades of red, brown, green, and gray of the creosote stains.

Another similar group, of which he is the architect, is being erected at Martha's Vineyard, on land of the Vineyard Haven Co. These exteriors are treated with the same material as the Newport group, and will be made to blend harmoniously with the landscape. This method of exterior coloring is coming more and more in vogue, and is universally successful and artistic.

THE new station of the New York and Northern R.R., at Yonkers, N. Y., has just been plastered with King's Windsor Cement, and is worthy of the attention of all in that vicinity who contemplate building. Mr. Geo. Edw. Harding, 40 Exchange Place, New York, architect, and Mr. Perry, contractor. The office of J. B. King & Co., the manufacturers, is at 24 State St., New York. The plastering department is represented by Mr. Lovell H. Carr.

THE CANTON STEEL ROOFING CO., of Canton, O., are now doing business and completely settled in their new plant, one of the largest and most convenient of the kind in the country. They are evidently enjoying their anticipated increase of business, as a statement from them for the first quarter of 1889 shows an increase of 32 per cent. over the same period last year. They are sending out a neat and instructive catalogue to all inquirers.

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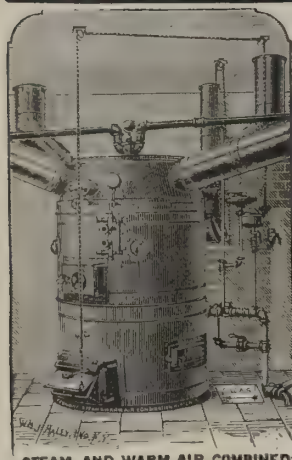
206 Water Street, New York.

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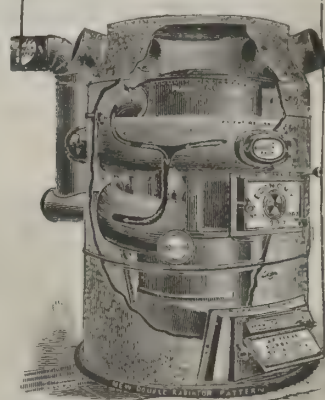
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without water-back, and with
or without elevated warming
shelf.

It has all the new features com-
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whole surface of fire to be ex-
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feature; the whole bottom of the
oven lifts out, enabling the flues
to be cleaned, as well as the bot-
tom oven plate itself; it has a
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necessary to remove covers to
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As a Brick Set Range,
it requires no brick work except
the jambs, all the flues being in
the body of the range. Therefore
it can be set by any bricklayer.

It is made either right or left
hand, single oven, with or with-
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The doors are all fitted with
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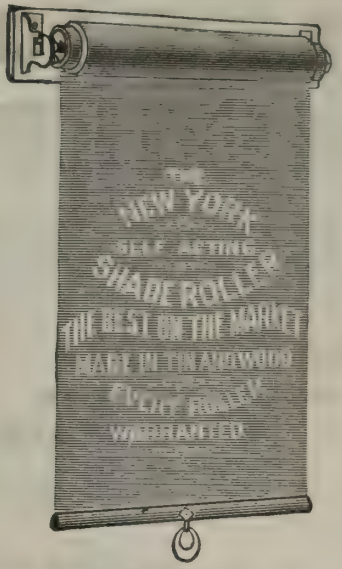
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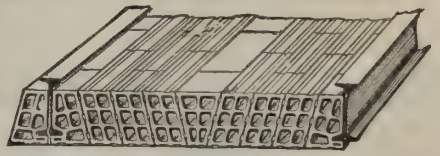
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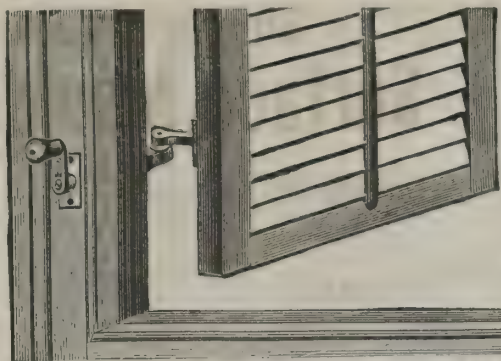
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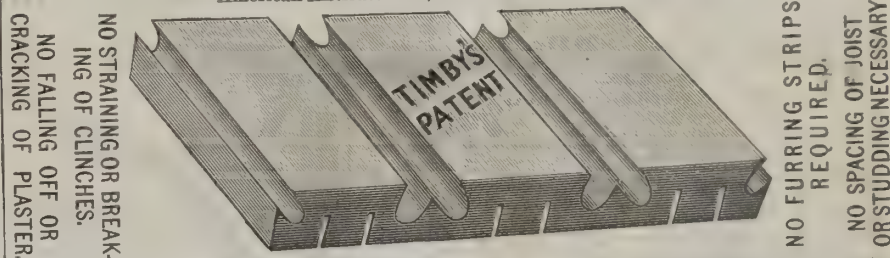
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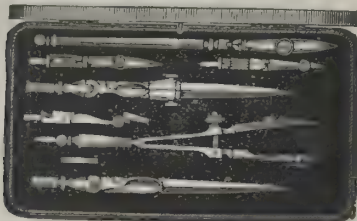
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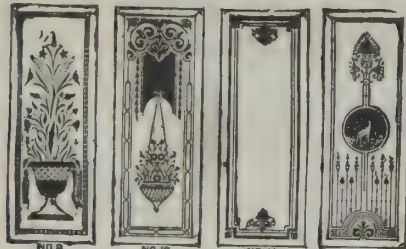
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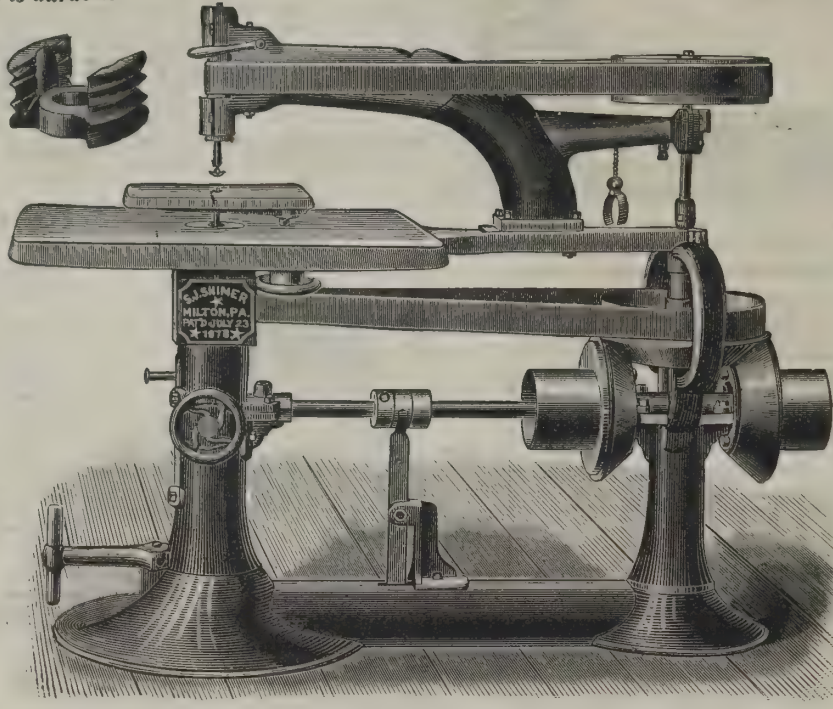
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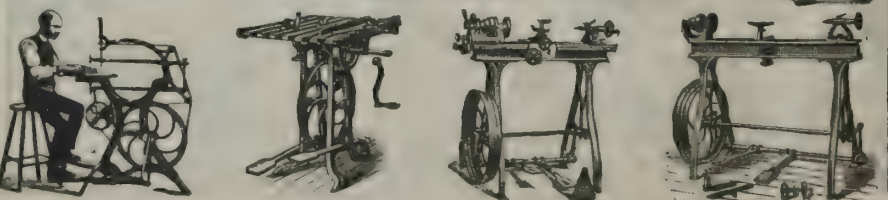
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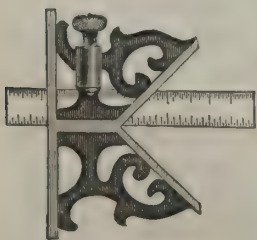
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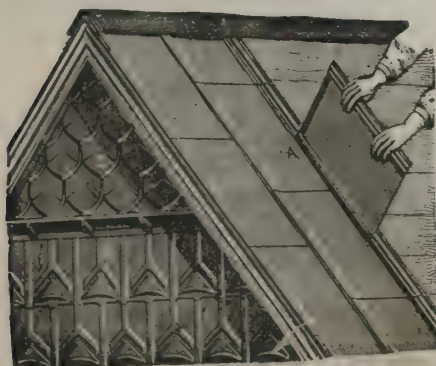


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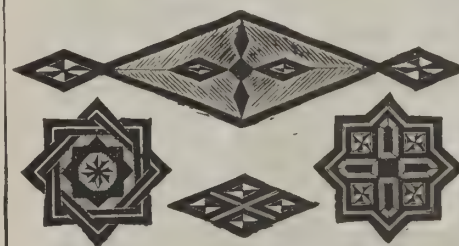
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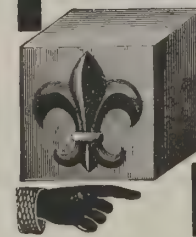
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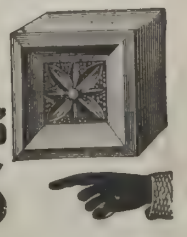
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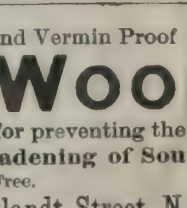
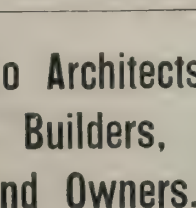
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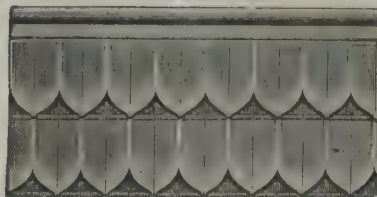
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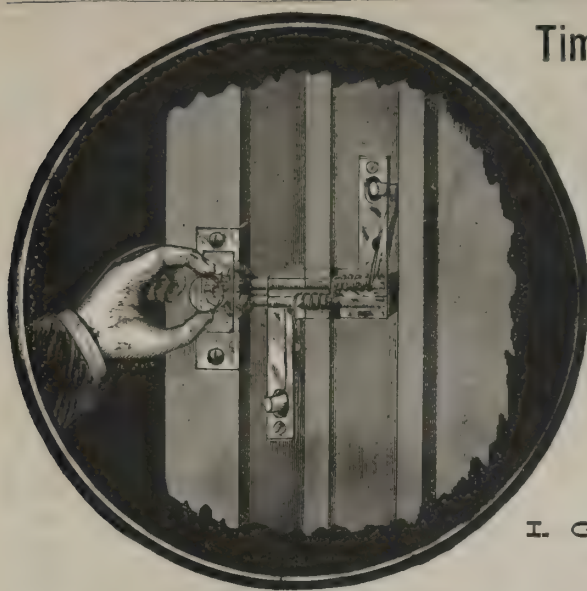
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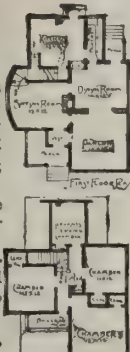


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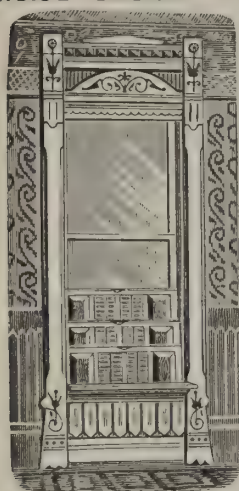
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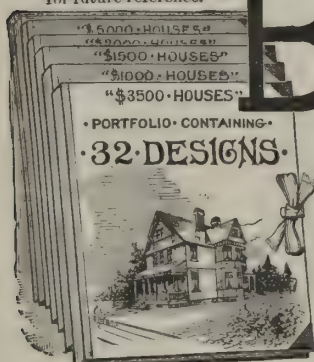
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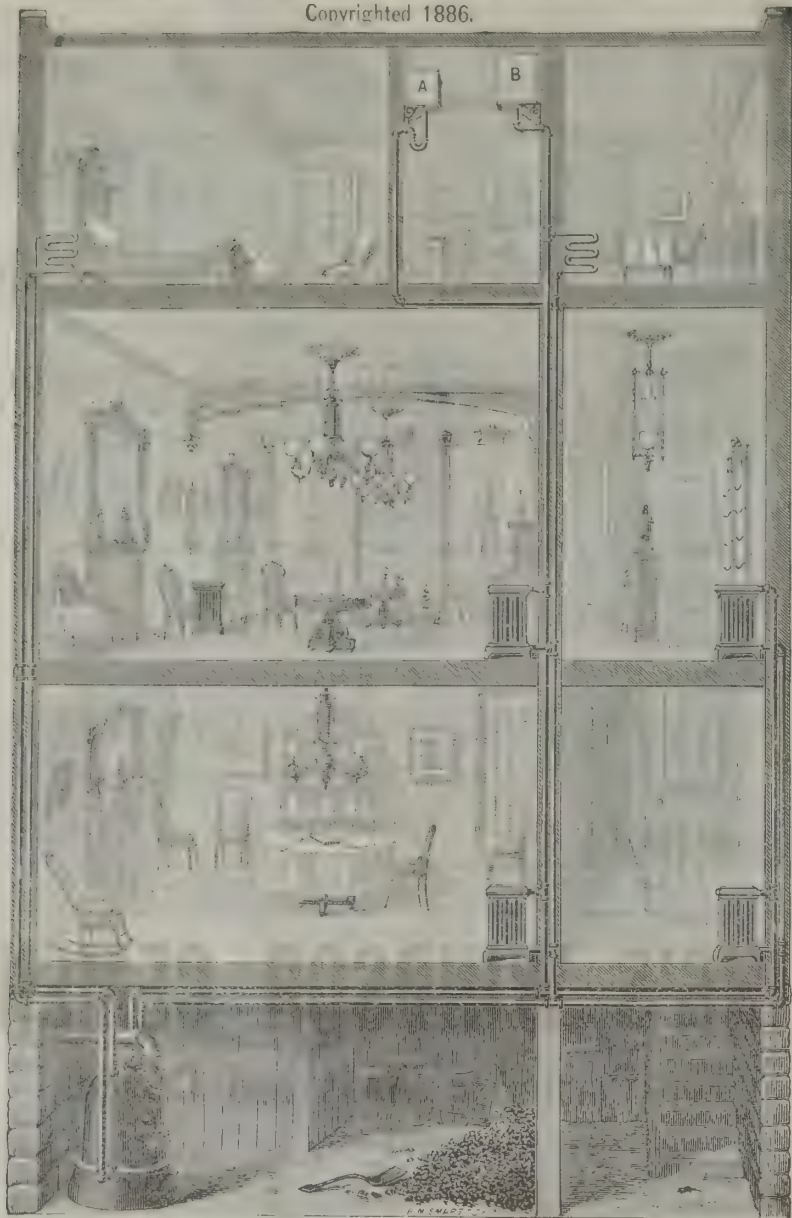
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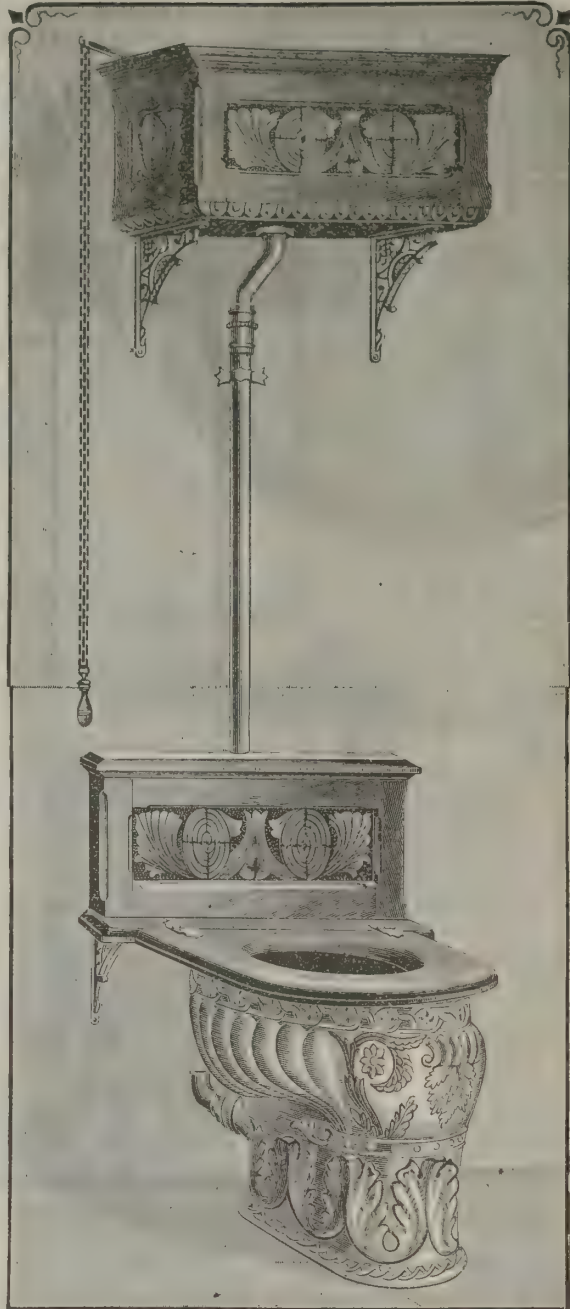
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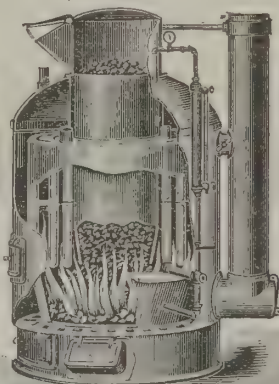
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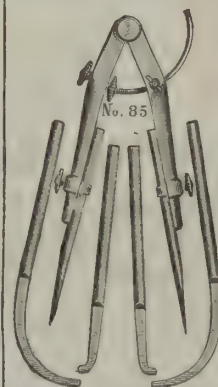
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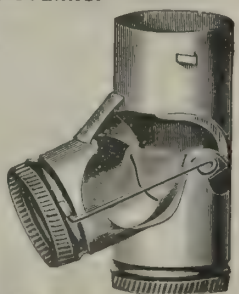
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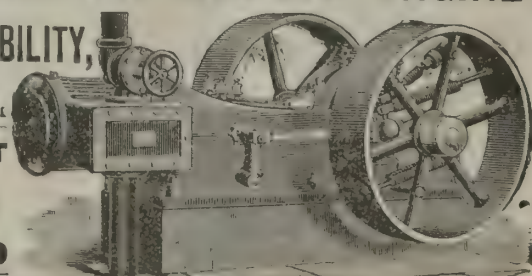
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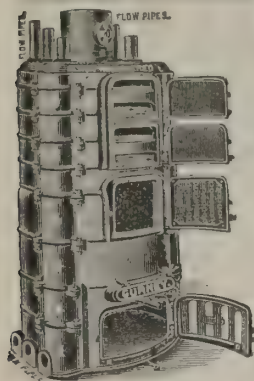
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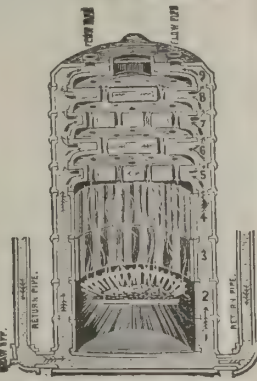
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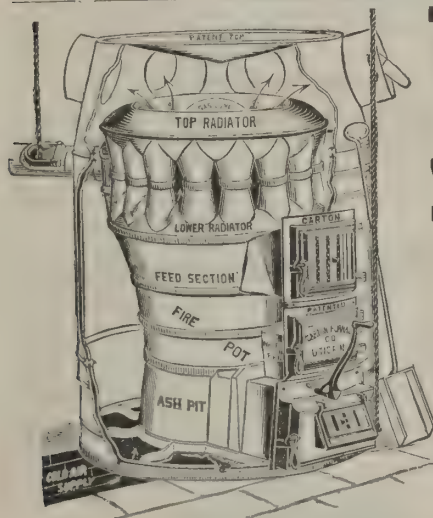
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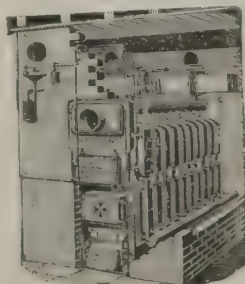
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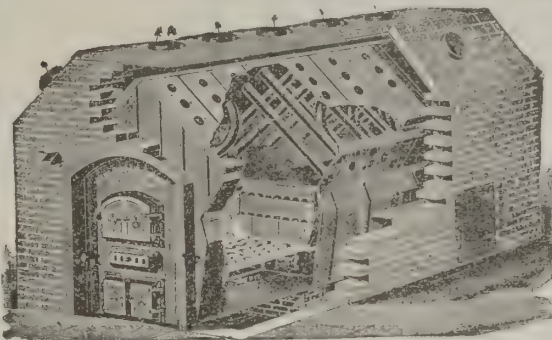
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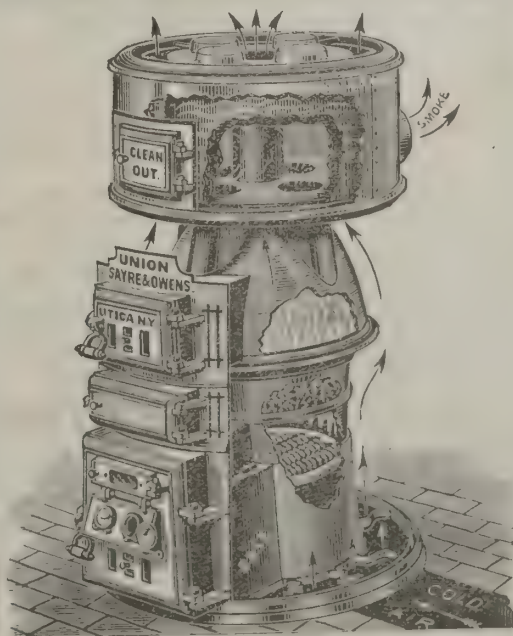
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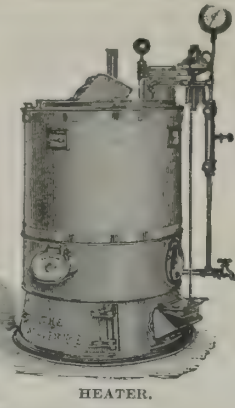
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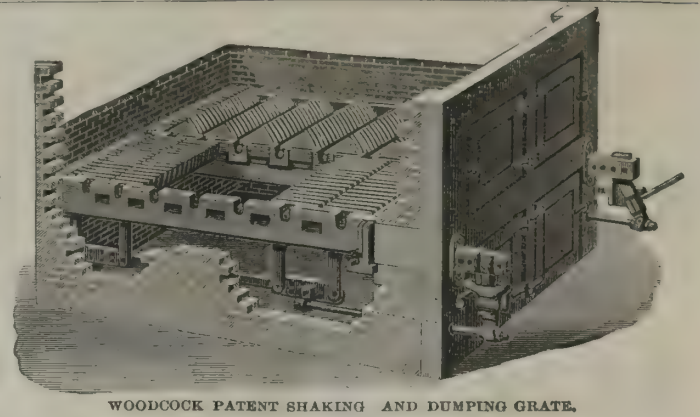
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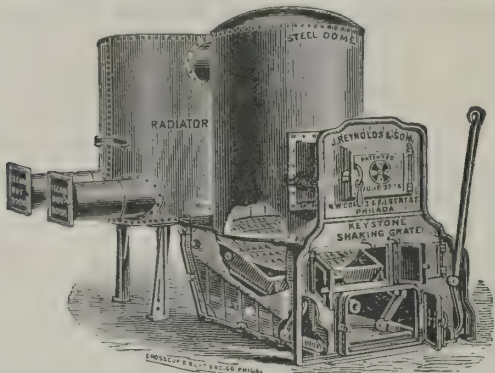


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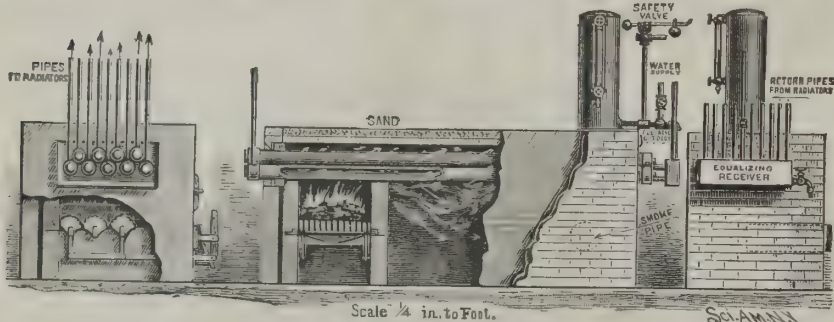


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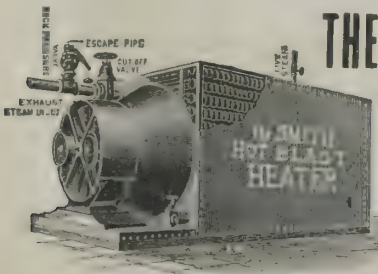
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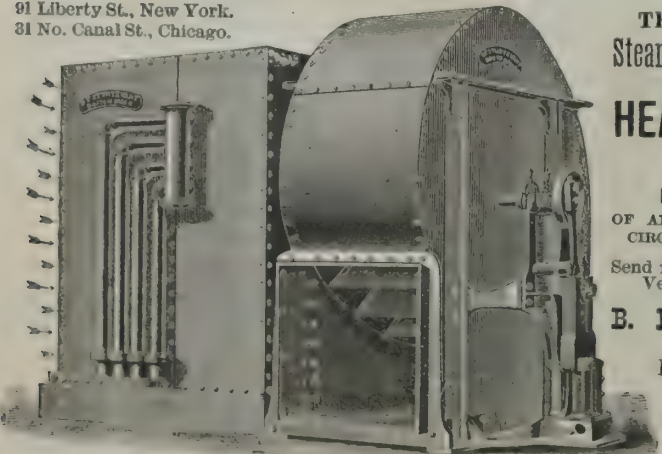
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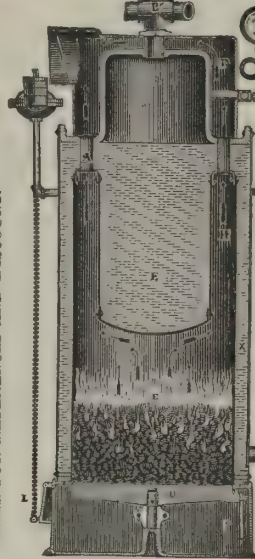
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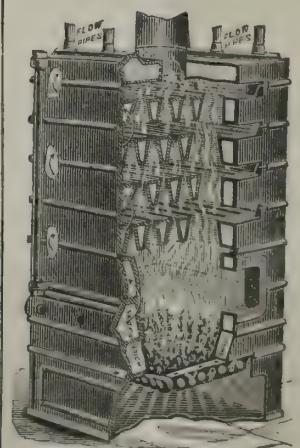
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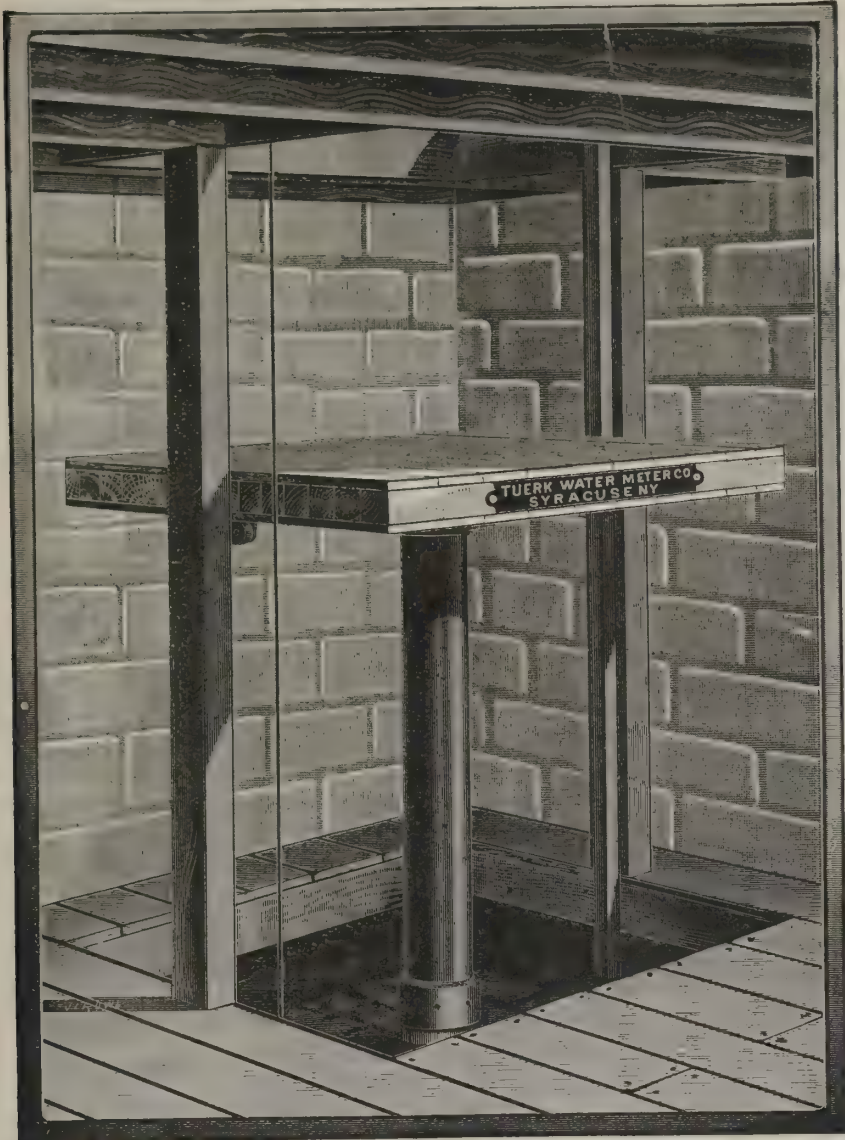
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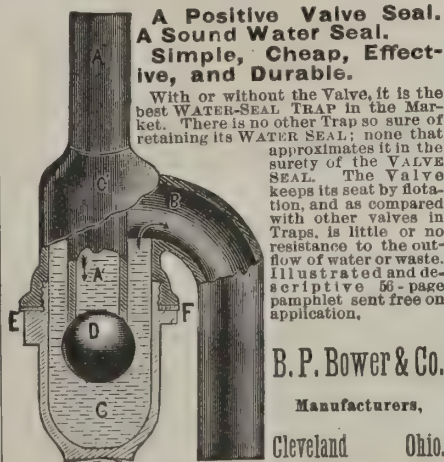
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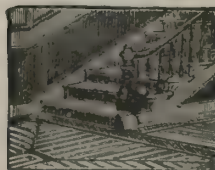


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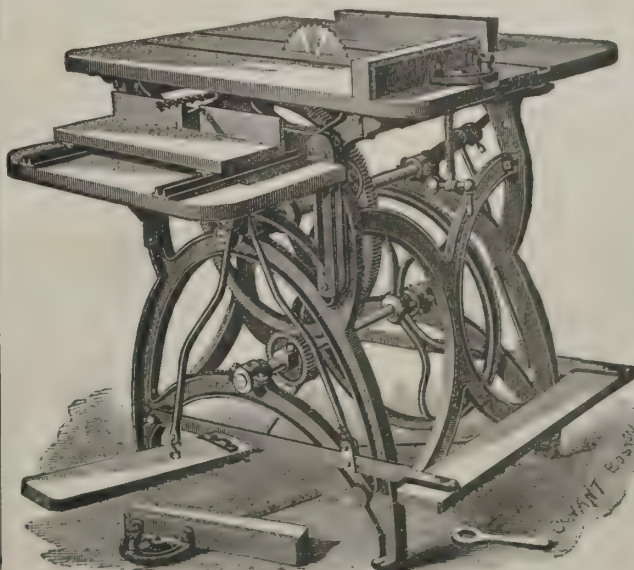
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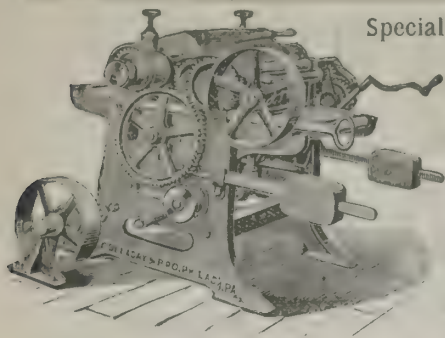


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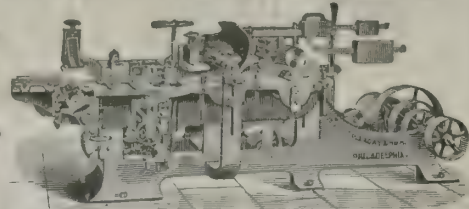
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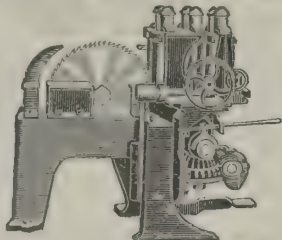


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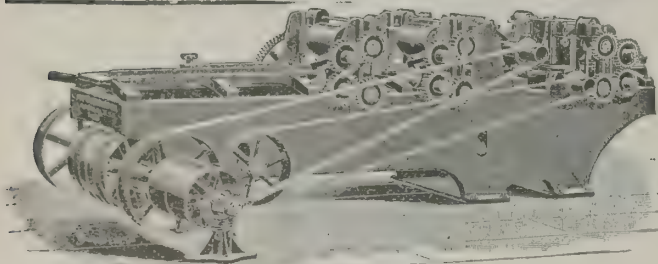
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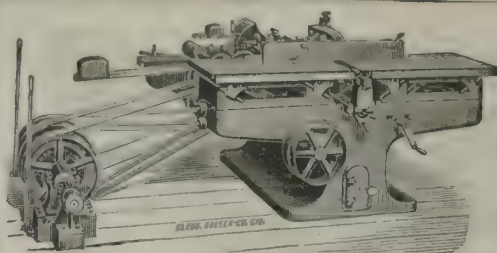
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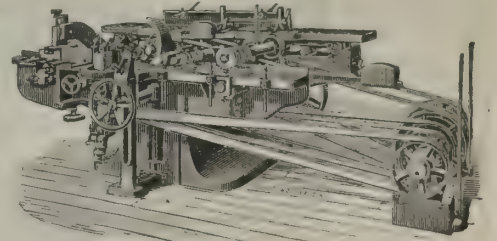
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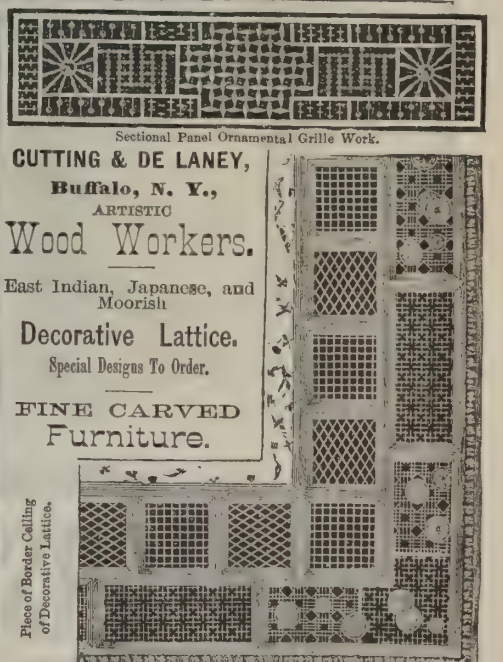
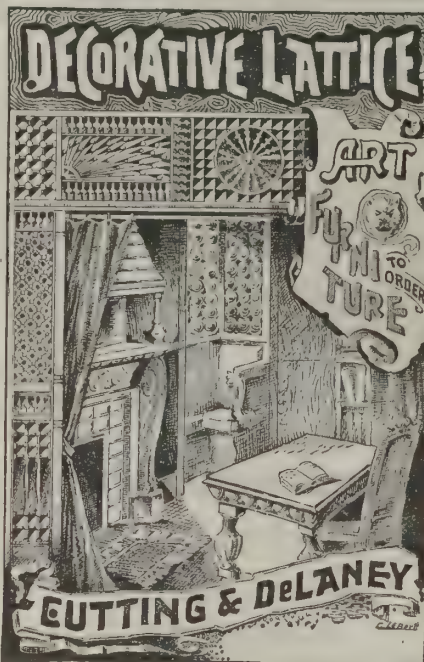
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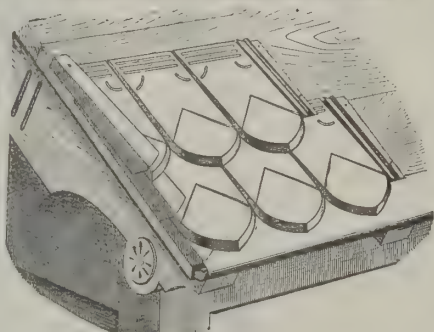
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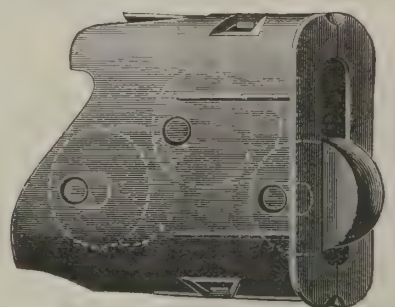
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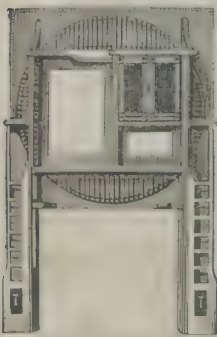
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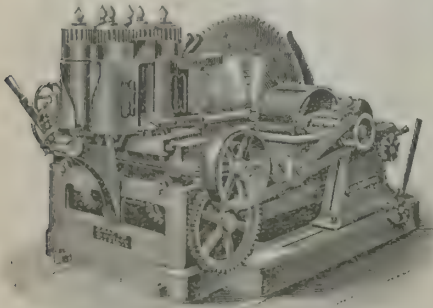
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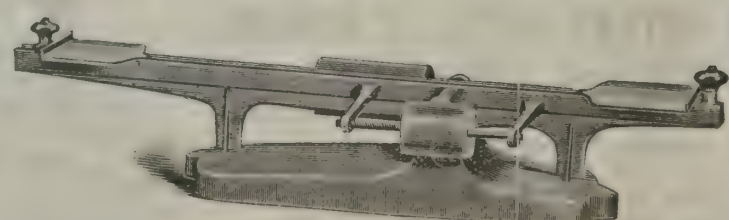
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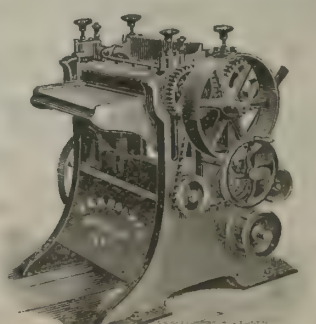
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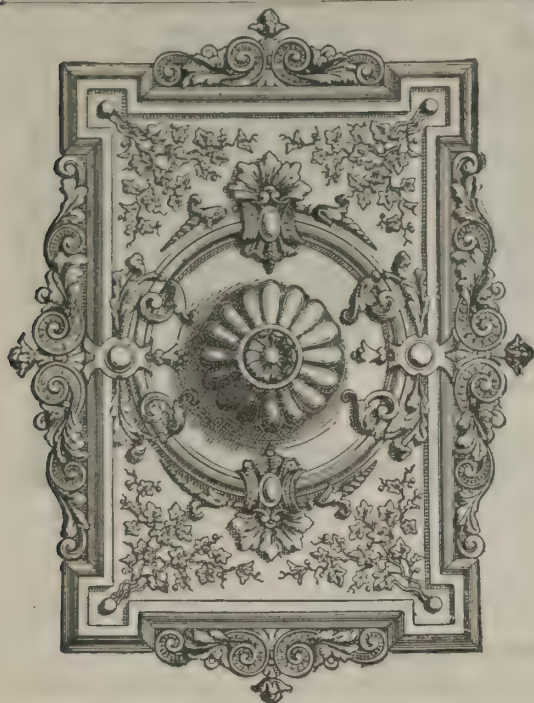
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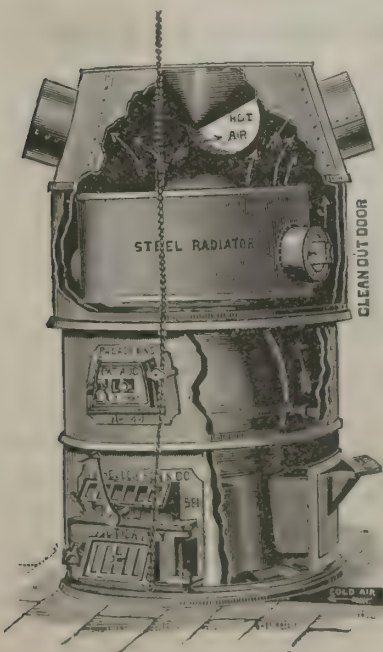
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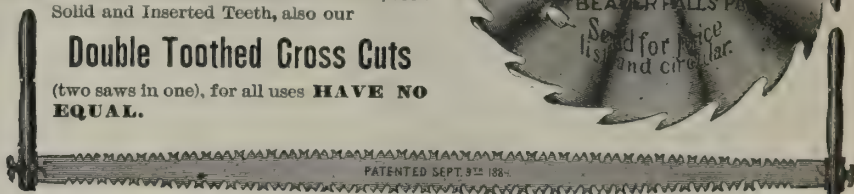
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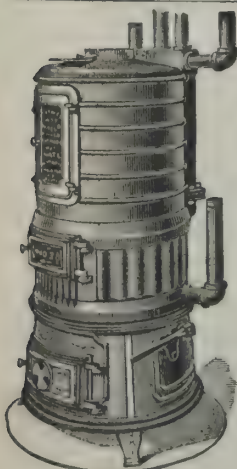


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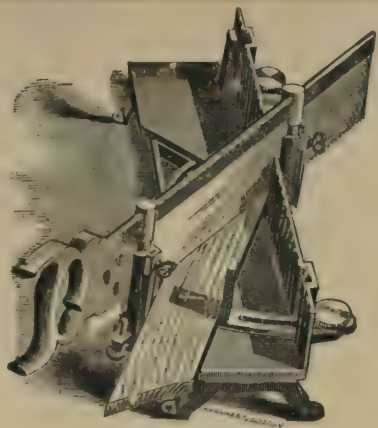
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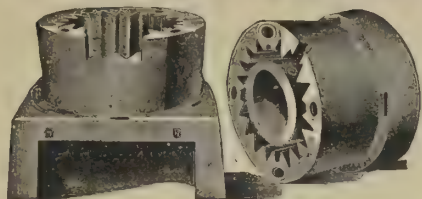
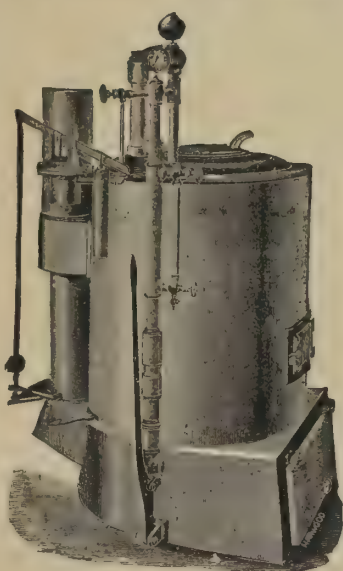
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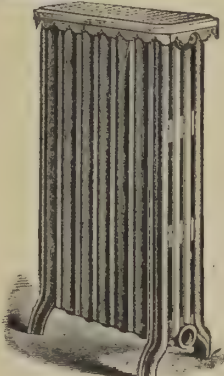


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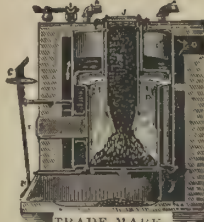
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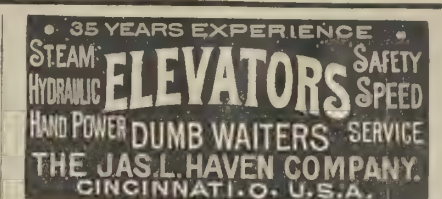


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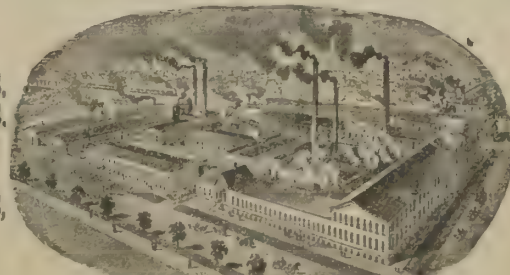
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